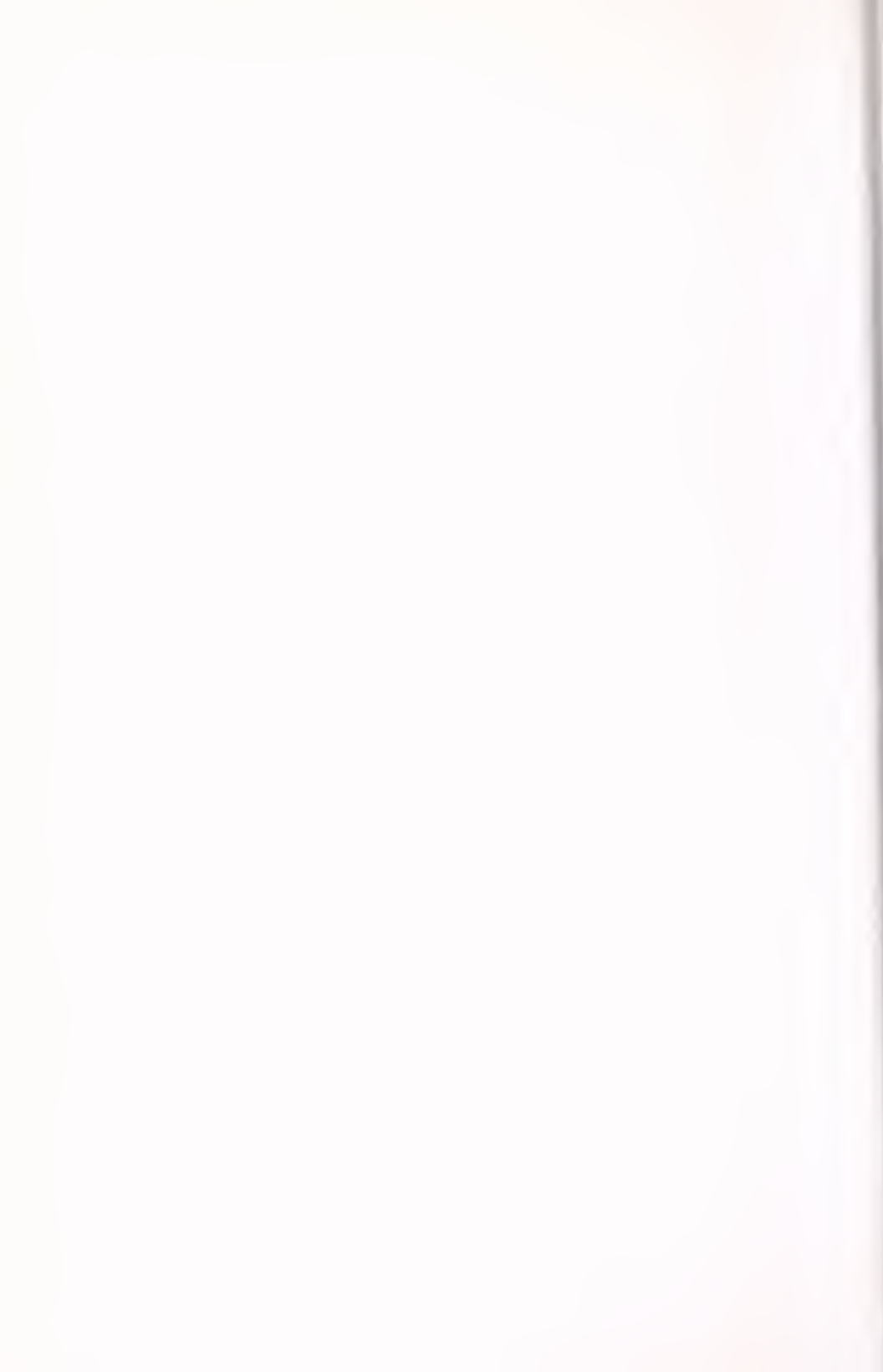


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ARNOLD ARBORETUM
HARVARD UNIVERSITY

ARNOLDIA



A publication of
THE ARNOLD ARBORETUM OF HARVARD UNIVERSITY

VOLUME XXXI

1971

PUBLISHED BY THE
ARNOLD ARBORETUM
JAMAICA PLAIN, MASSACHUSETTS

ARNOLDIA

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MAR 11 1971

NEW YORK
BOTANICAL GARDEN

ARNOLDIA

The Arnold Arboretum / Vol. 31 / No. 1 / Jan. 15, 1971



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Notes from the Arnold Arboretum

Perennials for Low Main- tenance Gardening Part I

ROBERT S. HEBB

Arnoldia Reviews

ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Mass. 02130

*Published six times a year: on the 15th of January,
March, May, July, September, and November*
Subscriptions: \$3.50 per year. Single copies, 60 cents

*Photograph of Robert Fortune from Plant Hunting in China by
E. H. M. Cox, with permission of Collins Publishers, London, 1945.*

*On the cover: Firmiana simplex and shrine. China 1909. Photo by
E. H. Wilson.*

Robert Fortune *and the Cultivation of Tea in the United States*

From 1839 until the Department of Agriculture was constituted in 1862, the Commissioner of Patents in Washington was responsible for organizing government aid and encouragement to American farmers. In the discharge of this duty, the Patents Office drew attention to foreign crops of economic value that might be cultivated in particular areas of the United States.

Among such crops tea figured prominently. An experimental tea plantation was privately established at Greenville, S.C., in 1848 and aroused considerable interest. The start of the experiment nearly coincided with the outbreak of the devastating Taiping Rebellion in China and prudent governments might well decide to experiment with tea in their own territories. The government of the United States was one such.

The Report of the Commissioner of Patents for the year 1855, on Agriculture,¹ discussed the advantages of establishing tea as an agricultural crop in some of the southern states and advocated the project as economically sound. It summarized the then current botanical knowledge of the tea plant, and quoted from Robert Fortune's analysis (published in his *Three Years' Wanderings* ²) of the tea plantations that he had visited in China during the years 1843 to 1846.

On the 21st July 1857 the Honorable Charles Mason, Commissioner of Patents at the time, wrote to his customary seed suppliers in London, the firm of Charlwood & Cummins of 14 Tavistock Row, Covent Garden, to inquire the probable cost of about ten bushels of tea seed, and "the expenses that might occur in sending an agent for the purpose of collecting the same."³ The seed merchants stated that they would "consult Dr. Royle ⁴ and Mr. Fortune," and hoped to supply the information in the next mail. They were as good as their word.

Fortune, who had returned to England eight months previously, from a visit to China on behalf of the East India Com-



Fig. 1: Robert Fortune, from Plant Hunting in China by E. H. M. Cox.

pany, collecting tea seed for the government plantations in the Himalayas, was visiting friends and relations in Scotland. Within a week the firm had got in touch with him, and on the 17th August they forwarded to Washington a copy of the preliminary letter he had addressed to them from Scotland. "No one in this country is so competent to give an opinion as Mr. Fortune," was their comment on this letter.

Fortune had written as follows:

Tea seeds are in great demand in India at the present time, and I doubt if a large supply could be obtained from that country. The finer varieties introduced by me from China, certainly could not be spared, and I would not advise the American Government to introduce and propagate inferior kinds. The best way would be to follow the example of the

Fig. 2: Trachycarpus fortunei. China. Hemp Palm valuable for its fiber. Photo: E. H. Wilson, 1911.



0355.

East India Company and introduce the *best kind* from China direct.

The plan proposed in your letter, viz. "to send the seeds in tin cases" would not succeed. From long experience I have found that these seeds, like acorns, chestnuts etc., retain their vitality for a very short time when out of the ground; — certainly not one in a thousand would vegetate on reaching America. Any money spent upon an experiment of this kind would only be thrown away.

You will find in my *Journey to the Tea Countries of China and India*, the plan I adopted with good success whilst engaged in introducing the Tea plant to India. If the American Government is determined to give the matter a fair trial and wishes to spend a reasonable sum to insure success I would have no objection to take the business in hand, and from the experience I have here, would most likely bring it to a successful issue.

Three days after sending this letter to the Commissioner of Patents, Charlwood & Cummins were reporting

We have had an interview with Mr. Fortune, and he informs us that he would accept the same terms from you, that he had from the East India Company, which was £500 per annum and all expenses paid, which would amount to about £700 additional: for this *he* would procure the best varieties of Teas. It would be too late this season as they ripen in October. He should leave this [? sc. country] in March and he would be able to get the seeds down from the North⁵ of China to the Port of shipment in November or December, and he would arrive in America (several shipments being made by various vessels) during April or May. Thus 20 or 30 (or more) Ward's cases could be sent each containing seeds enough to produce say 2000 plants. This could be effected during the year and Mr. Fortune assures us this way only (that is by the seeds being placed in soil in Ward's cases) is there any chance of success. . . . Should you therefore entertain the project of sending an agent — you can let us know whether we might engage Mr. Fortune, as we know of no other man so capable or experienced to carry out your views in this matter. ⁶

Fortune was engaged; and he proceeded to arrange the broad plan of itinerary and shipments. Seeds and living plants were to be divided among several vessels, to reduce risk of loss.

Should direct sailings to eastern seaports in the United States be insufficient, the Cape route to Europe could be used, with trans-shipment in the United Kingdom being handled by the U.S. Government agent in London, located in Henrietta Street, now W. 1. After despatching the collections from China, Fortune was to take the 'overland' route through Suez. The quick passage across the Indian Ocean, before the south-west monsoon broke, and a summer crossing of the North Atlantic, would save weeks on the journey from China to Baltimore round Cape Horn or the Cape of Good Hope.⁷

Fortune left England on the 4th March 1858 on his fourth journey to China. It has attracted singularly little attention at any time. For information regarding it, we are almost entirely dependent on the letters from Charlwood & Cummins already quoted, and from the series of Fortune's letters to the Commissioner of Patents,⁸ both sets preserved and available only in the National Archives in Washington. Perhaps for this reason, the cardinal importance of the journey, as the occasion of direct introduction of various Chinese ligneous and other species into the United States, has been consistently overlooked; and to place it on record, while giving a full account of the journey, is the principal purpose of this paper.

Fortune's reports to Washington do not state precisely where he went in the course of seven or eight months of active collecting. It seems likely that he made straight for his old haunts in Chekiang. The Taipings during 1858 held little more than the Lower Yangtze valley west of the Grand Canal. Pressure on them there had been somewhat relaxed as a consequence of the Anglo-French military operations against the Manchu government in North China. The more considerable operations of 1859-60 were to leave a way open for the rebels to overrun almost the entire province of Kiangsu south of the Yangtze, save for Shanghai itself, and again to extend their raids into Chekiang and Kiangsi. However, 1858 was a year of relative quiet. Fortune expressly states "the unsettled state of the country does not interfere with my plans in the slightest degree. Everywhere the people receive me kindly and wellcome (sic) me back amongst them."

He wrote this from Shanghai on the 10th August 1858 as part of his first report to the Commissioner of Patents. Accompanying it were three packets of seed which he thought "may prove worth cultivation in the U.S." Two contained varieties of the Chinese turnip-radish. The larger, and more particularly commended, contained seed of the *Brassica chinensis*

which he had already advocated for English and for Indian use because of the oil expressed from its seeds. He wrote to Mr. Holt that this variety of mustard or rape (reduced under *Brassica campestris* L., in the *Index Florae Sinensis*, Part I, p. 46, by Forbes and Hemsley) "is probably superior to the varieties cultivated in Europe, both in production of and in the value of the oil. The Chinese esteem it highly for burning in lamps, as well as for culinary purposes; the Ningpo ladies use it as a hair-oil." Word of a novel, even if possibly somewhat inflammable, dressing for the hair might have seemed welcome to the Patents Office of a generation overly dependent on macassar oil. Scientists at a later time might appreciate that there is a scientific reason hidden in the Chinese esteem for its unprepossessing loose-leafed appearance as a vegetable. It is an excellent source of the anti-scorbutic Vitamin C.

As to the main task of the journey, Fortune reports:

I have visited various great tea districts, and made my arrangements with the natives for large supplies of Tea and other seeds and plants at the proper season. I am now doing the same in the country about Shanghai, & if my health does not fail me, I hope to send you abundant supplies of interesting things during the autumn and winter. I am also employed in getting Wards cases made for their transmission.

After this letter, he again disappeared from view for nearly four months. He was making the round of the tea-farms that he had visited in the summer, to collect the seed that he had ordered. His transactions of former years, just and liberal, and the respect and liking in which he was held, now brought their material advantage. The seed had been saved for him, it was waiting and ready, and he had only to pick up the supply and go on his way. A quantity such as had taken him three years to procure, in his journeys for the East India Company, he now obtained in one season. Early in December, he was back in Shanghai, ready to start packing his autumn collections, and despatching them in successive shipments.

By an ingenious refinement of his former method, he now regulated the time of germination of the tea seeds sown in his glazed Wardian cases. They were not to sprout until late May or early June, when he was due in Washington to see to their replanting. Hence those in the first shipments were covered heavily with earth, to keep them dormant, and those of later shipments were covered lightly, to allow of early quickening.



Fig. 3: *Camellia sinensis* from *Medicinal Plants* by Bentley and Trimen, London, 1880.

The first shipment was on the 6th December, five cases in all. One was a box of tea seeds which, his report to Mr. Holt states, were "packed in earth in the manner recommended by you in one of your earlier letters." Fortune evidently did not trust this variation or experiment. He never used it again. For the rest of this shipment, and for all subsequent ones, he reverted to the glazed Wardian cases, in which the seeds were sown thickly in damp earth, to germinate in the salt-excluded equable moisture thus generated. In addition to several plants of the *yang-mei* or Chinese strawberry tree (*Myrica nagi* Thun. syn. *rubra*, whose value Fortune rated higher than did the rest of the world), the seeds of two interesting introductions accompanied the tea in the cases of the first consignment.

One was the t'ung-oil or wood-oil tree familiar to him from previous visits to China, *Aleurites fordii*, that he had attempted to promote for Indian acclimatisation. In America, as in India, he was unsuccessful in pressing the need to grow this hardy tree. The importance of the oil to commerce was barely realized in the 1850s. Yet Fortune was only a little too early in his advocacy. Within decades t'ung oil was a substantial item of foreign export from the Yangtze valley; and in 1901 the botanist David Fairchild, in the course of a round-the-world trip organized by the Department of Agriculture, visited Canton and observed the use of the oil as a ship's varnish and an ingredient in caulking material. As a result, he arranged for a supply of seeds to be sent to the U.S., where the tree was re-introduced in 1904, and successfully established thereafter in southern plantations.

The Chinese call *Aleurites fordii* the *wu-t'ung* tree. Popular names are part of the folk-lore of the race. They are no more likely in China than in England or America to distinguish botanical species; and they frequently confuse them. There is more than one kind of tree called *wu-t'ung*. Another of them happened to be included in this first shipment. Artistically, though not commercially, it was more important than the t'ung-oil tree. Fortune did not mention its botanical name. He merely called the seeds those of the "*oo-dung* an ornamental tree." *Oo-dung* is *wu-t'ung*, in this case *Firmiana simplex*, a tree of stately height, fine bark, and noble foliage and flower. The yellow flowers, though individually small, create a striking effect through being displayed on compound racemes eighteen inches long and nine inches wide. The seeds are enclosed in long pods that taper to a beak at one end. The leaves (in respect of which the former botanical name *Sterculia platanifolia* was



Fig. 4: *Boehmeria nivea*. China. A valuable textile fiber plant.
Photo: E. H. Wilson, 1910.

more descriptive) have sometimes three and sometimes five lobes. The character *wu* describes these features of leaf and seed-pod, for it is made up in part of the characters for “five” and “mouth.”

According to the Chinese, *Firmiana* is the tree in whose branches the phoenix loves to perch — the bird of happiness and renewal. Their proverbial rhyme, roughly translated runs:

In gardens where no wu-t'ung grows
There is no calling the phoenix to come.

If Fortune knew of that saying, he did not mention it to Mr. Holt in commendation of the tree. The visual appeal sufficed.

The phoenix tree had been known in England for a hundred years, having been introduced from Japan in 1757; and it was being grown in Kew Gardens by 1789. It flourishes in a Mediterranean climate of dependable summer warmth and sun following a mild winter. Gardens and public places of Virginia and South Carolina (where recently there were numerous very old trees) and New Orleans may have owed some of their beauty to Fortune's shipments (for there were several), notwithstanding the Civil War.

There were half-a-dozen more shipments of tea seed planted in Wardian cases, and of miscellaneous seeds and plants that winter, until the last on the 19th February 1859. Apart from a new *Thuja* and further supplies of *Firmiana simplex*, the trees were mostly those well-known to Fortune from his discoveries in earlier years. Several of the species had been recommended for trial in America by S. Wells Williams, the missionary, linguist, man of letters, and botanist, in Canton, writing to the American representative in China in 1850.⁹ The Patents Office was thus already aware of their importance.

To receive the products of Fortune's expedition, a five-acre plot in a central position in Washington had been acquired in 1858, and heated greenhouses had been constructed on the site. This plot was called the Government Experimental and Propagating Garden.*

One of its main purposes, from the outset, was to raise seeds and plants, of whatever provenance, for transmission to localities thought suitable for their exploitation. This work is discussed in the Annual Reports of the Patents Office, and subsequently of the Department of Agriculture.

Fortune left Shanghai early in March 1859, well pleased with the kinds and quantities that he had shipped. He had

* The United States Experimental and Propagating Garden was set up in 1858 under the aegis of the Patents Office on five acres of land on Missouri Avenue between Four-and-a-Half and Sixth Street. When the Department of Agriculture was separated from the Patent Office the garden was turned over to the new department. The first superintendent under the Department of Agriculture, William Saunders (1822-1900), complained that when he took over in 1862 he did not receive the records of what was growing in the garden.

In 1867 the Department of Agriculture moved to a new building erected for it west of the Smithsonian Institution. The grounds around the building were placed under Saunders' charge and were to be developed as an Arboretum. — Eds.



Fig. 5: Abutilon avicennae. China. Cultivated for fiber which is used for making ropes and coarse sacking. Photo: E. H. Wilson, 1910.

made a significant selection, and had sent, as the list in the appendix will show, a tried collection of highly ornamental and very useful plants whose value and adaptability he had proved over the years. As for the principal object of his journey, his final report from Shanghai, dated the 19th February 1859, stated that should the season's consignment reach Washington in good condition "the produce from the tea-seeds alone will render that plant common in every garden in America." Enough seed, giving over 32,000 plants,¹⁰ was flourishing in

the Propagating Garden that summer, and enough enquiries were coming in from potential growers, to justify his enthusiasm.

Travelling by the 'overland' route through Egypt from Suez to Alexandria by way of Cairo, Fortune expected to take ship from England to reach Washington late in May. However, in London he was handed a letter from a new Commissioner of Patents, S. T. Shugart, countermanding the plan to visit America. Fortune's disappointment was severe. His presence was necessary to get the best out of his seedlings. There was the strong desire to complete a horticultural mission.

As I have taken a deep interest in the success of this great experiment, it would have afforded me much pleasure to have given you the benefit of my experience in rearing and transporting to proper sites the Tea and other useful productions I have sent you from China. The most difficult part of this mission (namely the procuring and introducing these seeds and plants) being successfully accomplished, it will be a source of deep regret if the experiment should fail from want of that experience which can only be acquired in the country to which these plants are indigenous.¹¹

But for the preservation of a number of Fortune's letters in the National Archives, there would be as little direct record of his employment by the Patents Office, as there is of the reasons for its curtailment — reasons which we can only surmise to lie in a reduced appropriation for 1859. Not only is the series of official letters addressed to Fortune absent from the files, the Commissioner's Report on Agriculture for the year 1859 (devoted largely to the inception of the Government Experimental and Propagating Garden) does not disclose, any more than does the Report for 1858, that the "agent employed to visit China for the purpose of collecting the seeds of the tea-shrub and of other plants"¹² was Fortune; and in listing various oriental trees and plants recently received, that must have come from Fortune, mis-cites their origin. "50 plants of the Tung Oil Tree," "*Oodung*, and other ornamental trees," "*Rhus succedanea*, wax plant," and "The camphor tree, 21 plants," are too close to the lists referred to in Fortune's letters, for their origin to be doubted. Yet in each case they are stated to have come from Japan! Thus, since the outset, confusion and mis-statement have obscured the origin and introduction of several species sent to the United States by Fortune. Only in referring to

an unidentified oriental *Thuja* does the report name him, by saying: "Mr. Fortune states that, in China, it is the most ornamental of the species he has seen." Fortune's extant letters to the Patents Office do not contain this remark (though they record the despatch of a *Thuja* sp.); but the series is not complete.

The Secretary of the United States Agricultural Society, writing soon afterwards, had an acid comment to make on the circumstances of the mission. His account of the *Introduction of the Tea Plant*¹³ opened with the statement "Twenty-six thousand Tea Plants, either imported or raised from imported seed, have been distributed during the past spring by the Patents Office, and the experiment of acclimatizing this valuable production will doubtless be fully and fairly tried." It went on to say that the Commissioner of Patents had engaged Fortune to visit China, to procure plants and seed for the United States, and had terminated his employment when he was in London on his way to Washington; and added, "It is to be hoped that this dismissal really arose from a desire on the part of the government to economize, and not from the jealous fears of any subordinate official that Mr. Fortune would receive the honors attendant on the successful introduction of the tea plant."

When Fortune's letter after dismissal reached Washington, there was still another Commissioner of Patents. The new appointee, D. D. Bishop, accepted Fortune's claim for six months' salary in lieu of notice, provided Fortune would answer a detailed questionnaire on the raising of tea. The completed document in the National Archives, headed *Interrogatories concerning the culture of the tea plant in China*,¹⁴ affords an authoritative and concise compendium on the cultivation of tea in China and (Assam excluded) in India as of that date; and it was briefly summarized, for the benefit of would-be growers, in the Commissioner's Report on Agriculture for 1859.

If the Civil War was the prime reason for the failure of Fortune's tea experiment, the same political vortex was probably responsible for stifling another plan that his employment had suggested. Proposals for conserving his collections were being prepared in Washington almost before he had arrived in China. One of them might have produced the National Arboretum nearly seventy years earlier than the actual date of its founding, 1927.

There was a Botanic Garden in Washington that had been established in 1850, but it was not available to supply the Washington Park System with the large numbers of trees an-

nually required to ornament the streets and parks. The Patents Office took advantage of the impending arrival of seedlings from China, to propose to the Secretary of the Interior¹⁵ the establishment of nurseries for propagating all forest trees likely to be hardy in the Washington climate, and, as an adjunct or corollary, the establishment of an American arboretum to display every tree and shrub native to North America. The proposal was not then accepted; and when the Department of Agriculture was formed in 1862 many of the functions of the Patents Office were transferred to it — including further interest in the suggestion.

WILLIAM GARDENER

Dowsings, East Mersea, Nr. Colchester
Essex, England

Notes I

1. 34th Congress, 1st. Session: Senate: Ex. Doc. No. 20.
2. London, John Murray, 1847.
3. Quoted, Charlwood & Cummins to Patents Commr., 10 Aug. 1857.
4. John Forbes Royle, M.D., F.R.S., (1799–1858). Surgeon, H.E.I.C. Med. Service, Bengal, 1819. Curator, Bot. Gdn. Saharanpur 1823. Ret. to England 1831, thereafter serving H.E.I.C. as Reporter in India Products (i.e. senior advisor on agriculture & forestry). "Illustrations of the Botany of the Himalayas" 1834–8. Prof. Mat. Med. King's Coll. London 1837–56.
5. A term which, at this time, covered the provinces between, roughly, southern Fukien and the Yangtze.
6. Charlwood & Cummins to Patents Commr., 20 Aug. 1857.
7. Letter from Fortune to J. Holt, Pat. Commr., 1 March 1858.
8. Dates, and place of origin, of these letters are:
 - i. 1 March 1858, from 1 Gilston Rd., Brompton, London, (in reply to letters of 4th and 8th Feb. 1858, not traceable in Nat. Archives, from Patents Commr.).
 - ii. 18 Aug. 1858, from Shanghai.
 - iii. 6 Dec. 1858, " "
 - iv. 14 " " " "
 - v. 22 Jan. 1859, " "
 - vi. 25 " " " " , not traceable in Nat. Archives.
 - vii. 19 Feb. " " "
 - viii. 24 May " , from 1 Gilston Rd., Brompton, London,



*Fig. 6: Firmiana simplex. China. Three trees, seventy feet.
Photo: E. H. Wilson, 1910.*

- (in reply to letter of dismissal of 28 April 1859, not traceable in Nat. Archives).
- xi. 5 Aug. 1859, from 1 Gilston Rd., Brompton, London, (in reply to letter of 7 July 1859, not traceable in Nat. Archives).
9. Quoted Report of Pat. Commr. on Agriculture for 1850, pp. 450-453 (31st Congress, 2d Session: House of Representatives: Ex. Doc. No. 32).
 10. Report of Pat. Commr. on Agriculture for 1859, Experimental & Propagating Garden, p. 2 (36th Congress, 1st Session: Senate: Ex. Doc. No. 11).
 11. Letter listed Note 8, viii, above.
 12. Report of Pat. Commr. on Agriculture for 1858, p. v (35th Congress, 2nd Session: House of Representatives: Ex. Doc. No. 105).
 13. Journal of Agriculture, 1859, pp. 166-8.
 14. Dated 6th Sept. 1859.
 15. Commr. of Patents to Secretary of the Interior, 17 May 1858.

Notes II

Seeds sent to Washington from China by Robert Fortune, during the winter of 1858/9, as mentioned in his extant letters listed earlier (Bills of Lading not preserved).

FORTUNE'S DESCRIPTIONS

REVISED NOMENCLATURE

Brassica sp., "cultivated in Chekiang for the oil expressed from its seeds."

Brassica chinensis L. = *B. campestris* L.

Turnip radish called "Lobba," two varieties.

Presumably *hung lo-po* and *pai lo-po*, 'red' & 'white' turnip: forms of *Raphanus sativus* L.

Yang Mae Tree (*Myrica* sp.), "commonly called an arbutus here, but really a *Myrica*."

Myrica nagi Thunb. syn. *M. rubra* Sieb. et Zucc.

Tung-oil Tree (*Eleococcus oliifera*).

Aleurites fordii Hemsl.

"Oo-dung" "an ornamental tree."

Sterculia platanifolia L.f. syn. *Firmiana platanifolia* (L.f.) Schott et Endl. syn. *F. simplex* W. F. Wight.

FORTUNE'S DESCRIPTIONS

REVISED NOMENCLATURE

Hemp Palm (*Chamaerops*),
 "valuable for its fibre, a very
 ornamental tree, and much
 more hardy than any other
 species of Palm already
 known."

Laurus camphora (Camphor
 tree)

Stillingia sebifera (Tallow
 tree)
 "Both (sc. above) ought to
 succeed admirably in the
 United States, and both are
 not only very useful but very
 ornamental." (Letter of
 14.12.1858.)

Fraxinus sp. (Wax Insect
 Tree)

Buckwheat (*Polygonum*) "sent
 in the hope that it may prove
 superior to that kind al-
 ready in cultivation in
 America."

Rhamnus chlorophorus

Rhamnus utilis

"The two species yield (to-
 gether, sc.) the celebrated
 green dye which has excited
 a great deal of attention of
 late years in Europe."

Chinese Jute "a valuable
 fibre."

Cephalotaxus fortunei "an
 ornamental yew." This
 species was introduced by
 Fortune to England in
 1849.

Abies Kaempferi "a very fine
 new Cedar or Larch."

The Chusan Palm, *Trachycar-
 pus fortunei* H. Wendl. red.
T. excelsus H. Wendl.

Cinnamomum camphora T.
 Nees & Eberm.

Sapium sebiferum Roxb.

Fraxinus chinensis Roxb.

Fagopyrum esculentum
 Moench.

Rhamnus tinctorius Waldst.
 et Kit.

Rhamnus davurius Pall.

Abutilon avicennae Gaertn.

Cephalotaxus fortunei Hook.

Pseudolarix kaempferi Gord.
 syn. *P. amabilis* Rehder.

FORTUNE'S DESCRIPTIONS

REVISED NOMENCLATURE

Fortune discovered this tree in Chekiang and introduced it to England 1853.	
<i>Coronilla</i> sp. & <i>Trifolium</i>	<i>Medicago denticulata</i> Willd.
"Cultivated extensively for manure."	
<i>Thuja</i> sp. "an Ornamental new Arborvitae." ¹	(Not positively identified) [Apparently <i>Thuja orientalis</i> L.]
<i>Ligustrum lucidum</i> "a fine Evergreen."	<i>Ligustrum lucidum</i> Ait.
<i>Amaranthus</i> (with variegated leaves)	<i>Amaranthus oleraceus</i> L. var. [? <i>lividus</i> L.]
<i>Cupressus funebris</i> (Funeral Cypress)	<i>Chamaecyparis funebris</i> Endl.
<i>Cryptomeria japonica</i> (Japan Cedar) ¹	<i>Cryptomeria japonica</i> (L.f.) D. Don.
<i>Salisburia adiantifolia</i> "a noble and beautiful tree." ¹	<i>Ginkgo biloba</i> L.
<i>Ruellia</i> , producing the Indigo of Chekiang. Specimens of the plant from which the fabric called "grass-cloth" is prepared.	<i>Polygonum tinctorium</i> Ait. <i>Boehmeria nivea</i> Gaud.
Soap bean tree "pods used as soap." ²	See Note 2.

¹ Patent Office Report for 1859 records this species as grown in Governmental Experimental & Propagating Garden that year.

² The seeds or seed-pods of several species are used in China for soap. Fortune's is likely to be the *Caesalpinia* sp. (probably *C. chinensis* Roxb.) that he sent from Central China to the Agricultural & Horticultural Society of India in 1854 and 1855. *Gleditsia sinensis* Lam. is a possibility.



Notes on the History of Tea

It is surprising how incomplete our knowledge is. We are all aware that we import coffee from tropical America. But where do we obtain our tea? What is tea? From what plant does it come? How long have we been drinking it? All these questions passed through my mind as I read the manuscript of the preceding article. To answer some of my questions, and yours, I gathered together the following notes.

The tea of commerce consists of the more or less fermented, rolled and dried immature leaves of *Camellia sinensis*. There are two botanical varieties of the tea plant. One, var. *sinensis*, the original chinese tea, is a shrub up to 20 feet tall, native in southern and western Yunnan, spread by cultivation throughout southern and central China, and introduced by cultivation throughout the warm temperate regions of the world. The other, var. *assamica*, the Assam tea, is a forest tree, 60 feet or more tall, native in the area between Assam and southern China. Var. *sinensis* is apparently about as hardy as *Camellia japonica* (the common Camellia). The flowers are white, nodding, fragrant, and produced variously from June to January, but usually in October. The name is derived from the chinese *Te*. An alternate chinese name seems to be *cha*, which passed into Hindi and Arabic as *chha*, anglicized at an early date as *Chaw*.

The United States consumes about 115 million pounds of tea annually. The major tea exporting countries are India, Ceylon, Japan, Indonesia, and the countries of eastern Africa. Pakistan, Formosa and Argentina also export lesser quantities of tea. It is interesting to note that southern Russia produces a tea crop which is consumed domestically. Of course China also produces a large tea crop which is not exported to any extent.

Tea was being prepared in China at least as early as the 4th century A. D.; it was taxed as early as 793 (during the T'ang dynasty). Introduced into Japan (as an article of commerce) in the 9th century, it was cultivated there by about 1200 A. D.

An Arabian merchant named Soliman travelled to China about 850 A. D. and in an account of his travels described the use of tea in that country. Europeans, however, did not learn

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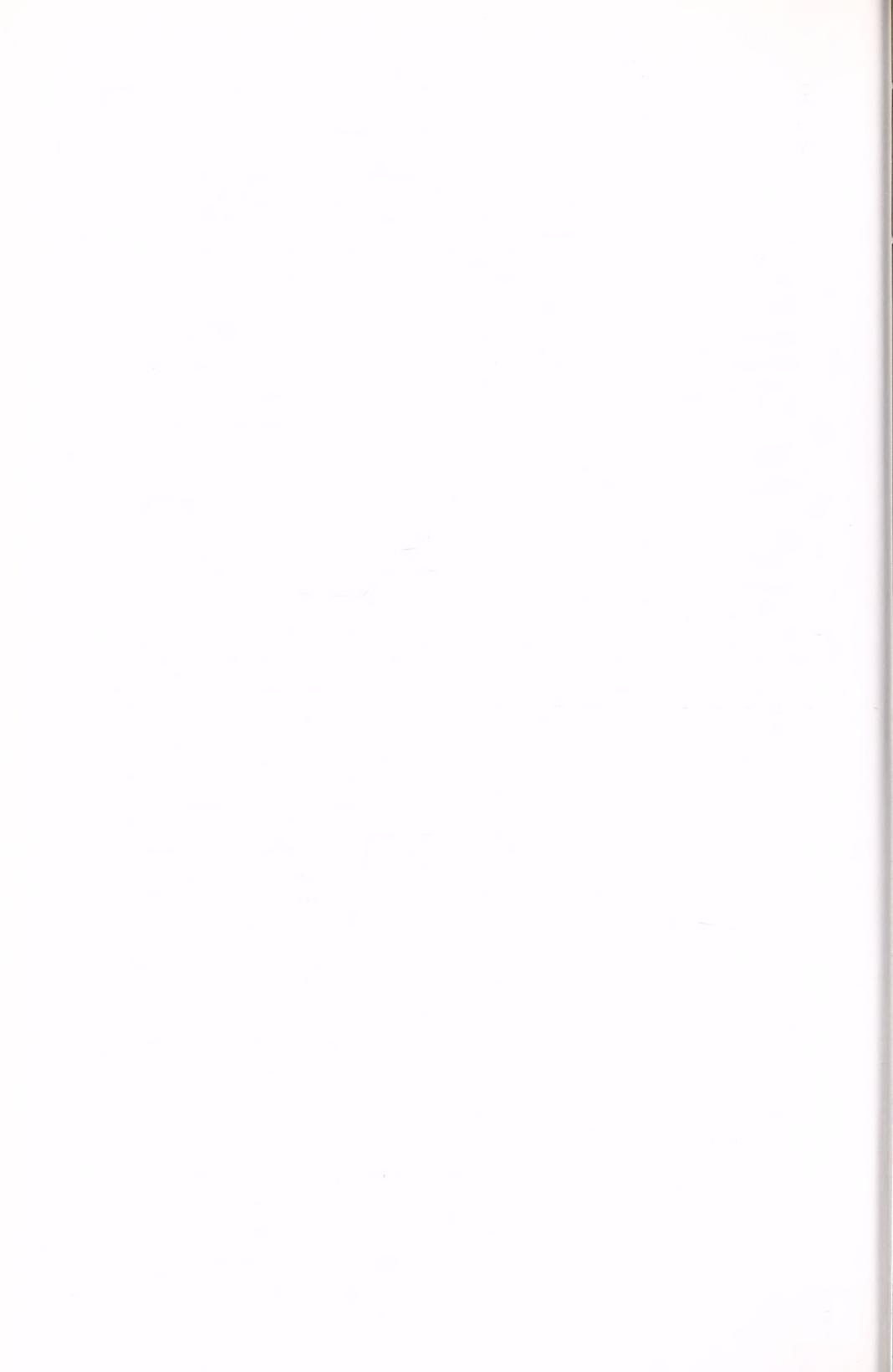


A publication of
THE ARNOLD ARBORETUM OF HARVARD UNIVERSITY

VOLUME XXX

1970

PUBLISHED BY THE
ARNOLD ARBORETUM
JAMAICA PLAIN, MASSACHUSETTS



ARNOLDIA

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about tea until the publication of Juan B. Ramusio's edition of Marco Polo's Travels in 1545.

It is not certain whether it was the Dutch or the Portuguese who first introduced tea into Europe very early in the 17th century. It was apparently first brought to the attention of the (British) East India Company in 1615. Between 1615 and 1657 small lots of tea appeared in London (imported from Holland) and sold for between £5 and £10 per pound. In 1657 the proprietor of Garroway's Coffee House obtained a large consignment and began offering the prepared beverage for sale. In 1664 the East India Company presented two pounds two ounces of tea to King Charles II, at a cost to them of 40 shillings per pound. By 1677 the demand was so great that the East India Company finally took steps to obtain a regular commercial supply of tea.

From 1660 until 1689 the prepared beverage was taxed in England at the rate of 8 pence per gallon. Beginning in 1689 a duty of 5 shillings per pound was levied, plus 5% *ad valorem*. The taxes were gradually increased, until about 1770 when they totaled 119% of the original value. It may be recalled that at that period the tax on tea figured in certain disturbances in the American colonies.

Tea was first known in the West only as dried leaves, and for a considerable period the true tea plant was unknown to western botanists. Apparently the first living tea plant in Europe was owned by one Captain Goff, a director of the East India Company. It is recorded that he grew it in his orangery, and that he would not part with any propagating material. In due course of events his plant died and the species was temporarily lost to cultivation in the West. In 1763 Carl Gustavus Ekeberg, the captain of a Swedish East Indiaman presented Linnaeus with seedlings of tea that he had germinated and grown on a return voyage from China. Living plants were reintroduced into England about 1770, and Thomas Martyn records that they were introduced into Georgia at about the same time. It is also recorded that the younger Michaux planted tea as an ornamental in the gardens of the Middleton Barony, on the Ashley River, about 15 miles from Charleston, S. C., about 1800.

Tea was introduced into Brazil in 1810. In an attempt to facilitate commercial production a colony of Chinese were settled in southern Brazil also. By 1850 the Chinese colony had broken up, but by then tea plants were widely distributed in Brazil.

About 1835 the (British) East India Company began planta-

tion culture of tea in India. It should be noted that by this time the Dutch had plantations in Indonesia which were producing tea commercially.

Dr. Junius Smith, a lawyer who was one of the founders of the British and American Steam Navigation Co., started a tea plantation on his property near Greenville, S.C., in 1848. Unfortunately he died in 1852 and his plantings were neglected. At about the same time a Dr. William Jones, in Riceboro (or McIntosh), Liberty County, Georgia, set out a tea plantation. In 1858 Robert Fortune was commissioned to obtain propagating material of tea, as is described in the preceding article. Fortune sent about 10,000 tea plants which were increased to 30,000 in a short time. Tea seeds were also imported from Brazil. These were distributed in the southeastern states until the war brought an end to this activity. After the war fresh supplies of seed were imported from Japan. In 1867 it was discovered that seed could be obtained domestically from the plants imported in 1858. Between 1868 and 1876 some 5,000 to 20,000 plants were distributed annually. Between 1877 and 1879 more than 100,000 tea plants were distributed. Apparently the plants grew well, but none of the recipients seem to have produced tea commercially.

In 1880 the Hon. W. G. Le Duc, United States Commissioner of Agriculture, engaged a Mr. J. Jackson, a British national who had had experience in tea production in India, to set up a model commercial plantation. The property formerly owned by Dr. Jones, in Liberty County, Georgia, was purchased, and his plantings were the source of samples of tea submitted to the Commission that spring. Mr. Jackson also planted more than 20,000 more tea plants that first year.

In the United States tea culture was encouraged sporadically by the government for the next thirty years but with little success. After the publication, in 1912, of Bureau of Plant Industry Bulletin No. 234 "The Cultivation and Manufacture of Tea in the United States," official governmental encouragement of tea cultivation seems to have ceased.

Gordon DeWolf, Jr.

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On December 14 a reception was held at the Administration Building in Jamaica Plain for the Sponsors, Patrons and Donors of the Friends of the Arnold Arboretum, to meet Miss Stephanie Sutton, on the occasion of the publishing of her book, *Charles Sprague Sargent and the Arnold Arboretum*.

Miss Sutton was present to autograph copies of her book while the Friends enjoyed refreshments and examined the displays of Sargent memorabilia. Examples of *The Silva of North America*, *The Forest Flora of Japan*, *Manual of the Trees of North America*, all by Sargent, were on display, as well as books by Alfred Rehder, E. H. Wilson, George Russell Shaw, and other contemporaries of Sargent. Also of interest were examples of "Garden and Forest," a journal of horticulture, with articles signed "C.S.S."

Another interesting item was a colored map of North America showing natural divisions of North American forests, prepared under the direction of C. S. Sargent.

A collection of photographs of remote parts of China and Tibet, by Joseph Rock, Wilson, and others, were displayed, as well as historic photographs of James Arnold, Joseph Rock, E. H. Wilson, and C. S. Sargent and his family. It was an afternoon of homage to Charles Sprague Sargent and of appreciation to Stephanie Sutton for her fine book.

Notes from the Arnold Arboretum

Perennials for

Low Maintenance Gardening

Part I

Herbaceous perennials have a reputation for being difficult to grow. Many of them are, and numerous favorites of long standing such as the Hardy Aster, Carnation, Delphinium, Lupine, Bee Balm, Phlox, and others require time and effort if good results are to be achieved. Some must be divided frequently to maintain robust vigor, others have to be staked or supported, some have serious insect and disease problems, and many simply do not live up to the promise of permanence so frequently heralded in the catalogs.

The Arnold Arboretum constantly receives inquiries for lists of dependable, hardy trees, shrubs, and ground covers, but few people seem aware of the relatively long list of perennials that adapt themselves well to shrub borders or foundation plantings. In fact, there are enough of these perennials so that the old style perennial border could easily come back to favor today if emphasis were placed on selecting those varieties which combine the virtues of a long life with relative indifference to neglect.

This past autumn the Practical Gardening Class at the Arnold Arboretum selected as a class project the renovation of a part of the Low Maintenance Garden at the Case Estates. For many years this garden has demonstrated that certain slow-growing shrubs can be combined with herbaceous perennials to make an attractive display. A number of the shrubs had grown large, and we decided to remove some of these to obtain space for displaying more of the perennials desirable in low maintenance schemes. Selection of the best varieties received much attention, and this article is an outcome of that selection.

In this discussion a deliberate attempt has been made to enumerate the disadvantages of many favorite garden plants, and this must be done if one is to end up with a list of the easiest types to grow. Catalogs of nurserymen have a decided

tendency to emphasize the advantages of all their offerings; for after all, nurserymen have to make a living, too. Most popular books on perennials do list the drawbacks involved, but this is frequently lost among lengthy descriptions and cultural formulae. Some of the plants described here have few faults; others will be dismissed in a seemingly harsh manner. Keeping the above objectives in mind, it is hoped that this will not cause undue alarm to that dedicated group of advanced gardeners who take delight in growing the more difficult plants to perfection.

Achillea — Yarrow, Milfoil, Sneezewort

This genus of the Daisy family is for the most part easy to grow and possesses the endearing ability to live on in spite of considerable neglect. Almost all adapt well to poor garden soils. In fact, average to poor soil which is somewhat on the dry side is best for them, as rich moist conditions will lead to weak growth and inferior flowers. The ability to withstand drought in open sunny locations and the finely textured, fern-like foliage which remains in good condition throughout the growing season are other points in favor of this group. Perhaps their worst fault is a tendency to spread rapidly by basal shoots, and ample space must be allotted to them. *A. ptarmica* (Sneezewort) and its various cultivated forms such as *A.* 'The Pearl,' *A.* 'Perry's White,' and *A.* 'Snowball' have definite invasive tendencies and do best when divided every year. For this reason, despite their value as cut flowers, they cannot be recommended here.

A. filipendulina (Fernleaf Yarrow) and its varieties and hybrids are decidedly the best for use in low maintenance type plantings. The author's favorite is a relatively new variety called 'Moonshine' which has a neat, compact habit and is well fitted for the front of the border. It grows to a height of only eighteen to twenty-four inches and staking is not necessary as is sometimes the case with the taller typical form of *A. filipendulina*. The silvery grey foliage contrasts with the sulphur-yellow flowers, which are borne over a long period of time in flat-topped umbel-like inflorescences. Beware the glowing descriptions of catalogs which describe this and other varieties as "blooming from June to the very end of September." This condition can only be achieved by faithful attention to the removal of the faded flowers. Few indeed are the perennials which are "ever blooming" when left to their own devices.

A close second to *A.* 'Moonshine' is *A.* 'Coronation Gold,' a taller and more robust form also with yellow flowers. *A.* 'Gold

Plate' and A. 'Parker's Variety' are occasionally available. They, too, fit into the above description and well-grown specimens often have flower heads up to six inches across. All varieties in this group provide good cut flowers which, if picked early, can be dried for winter arrangements.

A. millefolium (Common Yarrow, Milfoil) is widely naturalized in this country and is occasionally grown in medicinal herb gardens, but it is weedy and hardly worth the trouble in the border. The same holds for *A. millefolium* f. *rosea* a form with pinkish red flowers. Several improvements have been derived from this, which can be recommended, and we see offered such varieties as A. 'Fire King,' A. 'Cerise Queen,' and A. 'Crimson Beauty' which have flowers ranging from rosy-red to very deep pink. These grow to a height of one and a half feet and form a rather dense mat of growth which is best divided every third year. Apart from this, they require little additional attention.

A. ageratifolia and *A. tomentosa* are sometimes offered in catalogs for use in the front of the border. These are at best rock garden subjects, and of little use elsewhere.

Aconitum — Aconite, Monkshood

Plants which prefer to be left alone and which at the same time do not outgrow their welcome must be considered valuable. When they also display attractive glossy foliage throughout the season and provide conspicuous blue flowers which are excellent for cutting, they deserve to be widely grown. Attention is focused from time to time on the poisonous nature of the Monkshoods. Although it is true that no portion of the plant should be eaten, it is unlikely that human beings would find occasion to taste either the leaves or the roots of this plant. That excellent ground cover, Lily of the Valley, produces rather conspicuous red fruits which are also poisonous, but this is seldom held against it when planting time comes.

Monkshoods are sometimes planted near Delphiniums to provide a similar vertical effect in late August and September after the Delphinium fades. They resent hot summers and do best in partial shade in slightly acid soil rich in humus. The taller types often have to be staked to look their best, so choice of a shorter variety is advisable where maintenance will be minimal.

A. fischeri with violet-blue flowers stands sturdy and erect at two and a half to three feet, whereas its variety *A. fischeri* var. *wilsoni* towers to six to eight feet and requires support. *A. napellus*, the English Monkshood, is quite variable with flowers

ranging from blue to violet and its foliage is more finely divided than the others. It, too, may require support.

The best of several cultivars of *A. napellus* is *A. 'Bressingham Spire'* and although it is difficult to find, it is in the trade in this country, and well worth the effort to locate. The flowers are a deep violet-blue. The three-foot terminal spikes are followed by several secondary spikes from halfway up the stem. These prolong the flowering period by a few weeks and do not detract from the upright "Gothic" form of the plant. As to staking, one well-known English writer states that the stems are "strong enough to resist a tornado."

Amsonia — Amsonia

Amsonia tabernaemontana is an American plant native from Pennsylvania to Florida and Texas. It has been neglected by gardeners and yet it is one of the easiest plants to grow that we have.

It is insect and disease free, slow-growing and never invasive, does equally well in moist or dry soils, is easily transplanted, never needs staking, does well in sun or partial shade (perhaps a little better in shade), and the foliage remains in excellent condition throughout the growing season. The tough stems are said to be quite resistant to wind and the plant will thrive in seaside gardens.

Perhaps this long list of virtues will pardon *Amsonia* for not being the showiest plant in the border when in blossom. However, the steel-blue flowers in terminal panicles are most attractive when at their best in May.

The plant usually attains a height of three to four feet and a few nurseries list a "dwarf variety" of *A. tabernaemontana* which grows from two to three feet tall. This latter is probably not a variety at all, but another native species, *A. ciliata*, which is suitable for growing at the front of the herbaceous border.

Anchusa — Alkanet, Bugloss

Some plants are best admired in other people's gardens; perhaps this is one. *A. azurea* the Italian Alkanet blooms for a long period and has true-blue flowers, a color which is always welcome. It is not particular as to soil, provided it is well drained. However, while it requires no staking it is coarse and bristly, and as it grows to a height of five feet, it is suited to the back of the border only. After about the second year the plants invariably start to deteriorate. It also has a habit of seeding in and taking over territory not assigned to it, thus becoming a

nuisance in a small garden. A. 'Royal Blue' is a dwarf three-foot cultivar now available in this country. It appears to be a vast improvement and if one must have Alkanet, this is the one to try. It should not require staking, but will have to be divided after the second or third year if it is not to peter out.

Anchusa mysotidiflora is listed in many catalogs. This is properly *Brunnera macrophylla* (see below), a much more worthy garden subject than the true Alkanet.

Aquilegia — Columbine

Unless one can provide excellent drainage, Columbines are apt to be transitory in nature and of no value to those who have little time to continuously replace plants. They should be tried, however, for if they find conditions to their liking they seed in over large areas on their own, and seedlings in any unwanted places are quite easy to control. Many of the fancy long-spurred varieties show a decided tendency to degenerate to all sorts of "mongrels" when seeding occurs, but A. 'Copper Queen,' A. 'Crimson Star,' A. 'Snow Queen,' and A. 'Rose Queen' have the reputation for reproducing surprisingly true.

Columbines have another bad feature which must be taken into consideration if space is limited. Often they suffer from leaf miners which are difficult to control and when the brief show of flowers is gone, one is left with a not-too-beautiful display of debilitated foliage.

There are a large number of species and cultivated strains to choose from. The alpine sorts are difficult and should be avoided by the novice. A. 'Mrs. Scott Elliot' and A. 'McKana's Giants' are old favorites of vigorous growth and fairly easy culture.

Artemisia — Artemisia, Wormwood

Soft silver or gray foliage can be used in a number of ways in the perennial border, either to provide notes of accent or as contrast to such colors as blue, red, pink, or yellow. Of the plants which possess this characteristic, *Dianthus* (Pinks and Carnations) are difficult to grow in the Boston area and other places where summers are hot and dry; *Santolina* is not reliably hardy; *Lavandula officinalis*, the true Lavender, and its variety *L. officinalis* var. *nana* and various hybrids will survive, but in exposed situations they may require winter protection; *Stachys olympica* and *Cerastium tomentosum* have excellent gray foliage and are hardy, but both have definite invasive tendencies.

One variety of *Artemisia* is reliably hardy and very suitable

for planting in low maintenance schemes. This is a cultivated form of *A. schmidtiana* var. *nana* known as 'Silver Mound.' It forms a rounded, mound-like plant about one foot high and a foot and a half in diameter. One failing is that if planted in too rich a soil, growth is lush and the mound of foliage flops and opens in the middle. It would be best to consider this plant where hot, sunny conditions prevail and soil conditions are relatively poor.

A. albula 'Silver King,' and *A. albula* 'Silver Queen' are frequently offered in catalogs. They form a mass of silver gray leaves on stems two to three feet tall and provide excellent dried leaves for winter arrangements. However, they are disappointingly short lived if not divided annually and they cannot tolerate wet winters.

Aster — Hardy Aster

Hardy Asters can be given very little attention here, and the gardener who has a minimum of time is advised to stay away from this group. The well-known Michaelmas daisies of English gardens are all cultivated varieties of our own native New York Aster, *A. novi-belgii*. Annual spring division is almost a necessity if good shape is desired. So, too, is staking and cutting back in midsummer.

Numerous other species and varieties are available and some of the dwarf cultivars are excellent, both for the perennial border and for the rock garden, but they all should be divided every second or third year.

Astilbe — Astilbe

Astilbes suffer from the same affliction as the Asters, they need to be transplanted every few years to maintain their vigor. This is unfortunate because the flowers of the modern *Astilbe* hybrids can be obtained in a number of very pleasing pastel shades. They have become an almost indispensable feature of waterside plantings and thrive where soils are moist and rich. Partial shade is beneficial where moist conditions cannot be relied upon throughout the summer.

Astilbes would be my personal choice over Asters, Chrysanthemums, Carnations, or Delphiniums if I could grow only one group of perennials which require extra attention. This is due largely to the attractive feathery panicles of flowers which range in color from purple to red, pink, or white. Some of the best Astilbes offered today are cultivars of *A. x arendsii* produced by George Arens of Ronsdorf, Germany. They usually



Fig. 8: Low maintenance garden at the Case Estates. Photo: P. Bruns.

grow to about two feet tall, but under ideal conditions they may reach three and a half feet.

A. 'Federsee' (rosy red) and A. 'Irene Rotseiper' (lilac rose) are of robust growth and better able to withstand dry conditions than most. Other good cultivars are A. 'Etna' (garnet red), A. 'Fire' (intense salmon red), A. 'Garnet' (deep rose), A. 'Red Sentinel' (deep brick-red), A. 'Rheinland' (bright pink), and A. 'Vesuvius' (fiery red).

Baptisia — False or Wild Indigo

It has been suggested that *B. australis* (the False Indigo) might be desirable for those who have difficulties with Delphiniums and Lupines. If grown specifically for this purpose it may prove to be a rather poor substitute, but the plant is of value in many other ways.

It does not require a rich soil, has no serious insect or disease problems, will live on for a number of years in one spot, and will not become invasive. Although it will tolerate full sun, best results are obtained in partial shade. The indigo-blue flowers are borne in terminal racemes on stems reaching three to four feet. After flowering in May, attractive inflated black pods develop, which are useful in dried arrangements. *Baptisia australis* is also a member of that group of plants whose foliage remains in good condition all summer.

B. tinctoria (the Wild Indigo) has small yellow flowers followed by small black pods. It is better suited for wild areas than flower borders.

Brunnera — Dwarf Anchusa, Siberian Bugloss

Brunnera macrophylla (Syn. *Anchusa myosotidiflora*) is a very easy plant to grow where conditions are shady and the soil is moist. It is extremely hardy and tolerates much neglect. Of particular value are the branched racemes of tiny true-blue star-like flowers which are darker than those of Forget-me-nots. The plant blossoms during April and May and can be used for a ground cover in shady places. It can also be used individually and in small groupings in the flower border.

Ceratostigma — Blue Leadwort

Ceratostigma plumbaginoides is most frequently listed in catalogs as *Plumbago larpentae*. It is a desirable little plant which produces clusters of light blue flowers during late summer and early fall. The plant is hardy if it is given sunny conditions, rich soil, and excellent drainage.

Six to eight inches is its maximum height, and when left undisturbed a single plant will form a clump twelve to eighteen inches across. In the fall the leaves turn to a bronze-green and this color intensifies with cooler weather.

Chrysanthemum — Hardy Chrysanthemum, Pyrethrum, Shasta Daisy

This very large group of the Daisy family contains a great number of subjects which are nearly indispensable in the herbaceous border, but there are several problems when considering them in a planting designed for a minimum of maintenance.

The "Hardy Mums," by far the most widely planted of the group are best if divided every year (or at least every other year). Similarly, Cushion varieties should be divided every other spring. Winter protection is often necessary as the root systems are shallow and subject to heaving during alternate periods of freezing and thawing. *Chrysanthemum coccineum* (the Painted Daisy or Pyrethrum) and varieties of *C. maximum* (The Shasta Daisy) must also be divided every second or third year, and not all cultivars are dependable over a wide range of conditions.

Whole books have been written which describe the many varieties of *Chrysanthemum*. This will not be attempted here due to their limited value in the low maintenance garden.

Cimicifuga — Snakeroot, Bugbane, Cohosh

These are rather stately plants five to eight feet tall which, when well established, can be left alone for many years. The small white flowers are produced on long racemes well above the shiny compound leaves. They are best used as single specimens in the herbaceous border but adapt themselves equally well to massing at the edge of a pond or stream. A moist soil with a high organic content will suit them best.

Two species are commonly available. *C. racemosa* (Black Snakeroot or Bugbane) will, under ideal circumstances reach a height of nearly eight feet although it grows from five to six feet under normal conditions. It blooms from late June to early August, the flowering period being prolonged by the production of lateral branches. *C. simplex*, the Kamchatka Bugbane, reaches a maximum height of three feet and blooms in late September and October.

Clematis — Clematis

The numerous climbing woody varieties of *Clematis* are demanding when it comes to the proper conditions for good growth.

This is not so with the herbaceous kinds, but few amateur gardeners know of their value. Although not as showy as the climbers, they bloom over a long period during the summer and, once established, become permanent additions to the garden. They require rich, well drained soil and benefit from occasional applications of lime. Full sun or partial shade is satisfactory.

C. integrifolia 'Coerulea' has large porcelain-blue bell-shaped flowers. Although it attains a height of only two feet, the stems have a tendency to flop if not supported. Where this cannot be done, allow plenty of room so that the plant will not crowd its neighbors. When given a moderately moist situation, or if watered during dry spells, it will bloom from June to August.

C. recta var. *mandshurica* is valuable for its white flowers in terminal and axillary clusters during June and July. It is very vigorous and best seen as a single specimen near the back of the border. Again, one should allow ample room for this vigorous grower.

C. heracleaefolia var. *daurica* (sold as *C. davidiana*) flowers later than the above; its blue flowers are welcome in August and September. The fragrant tubular flowers are produced in terminal and axillary clusters on stems two and a half to three feet high. The compound foliage has a decidedly coarse appearance and it would be best not to feature this plant in the most prominent part of the border.

Coreopsis — Tickseed

A few members of this large genus of the Daisy family are excellent for the low maintenance border, but many lack complete hardiness or are best seen naturalized in a wild garden. All are of value for their showy yellow flowers which last well when cut.

One of the best is the Thread-Leaf Coreopsis, *C. verticillata*. It makes dense clumps about two feet tall, and although individual flowers are small, they are freely produced among the finely textured leaves. It blooms from June to September. Another good feature of this plant is the ability to withstand dry soil conditions. *C. verticillata* 'Golden Shower' is about six inches taller and has larger deeper yellow flowers.

C. grandiflora is perhaps the showiest of the group, but too often it behaves as a biennial and for that reason cannot be considered here. *C. lanceolata* is similar in appearance and of greater value. The showy two-foot plants will withstand much neglect if planted in a sunny location.

The best tall species to grow is *C. tripteris*. It has slightly fragrant flowers one and a half inches across, which are pale yellow with a disk that turns brown or purple. It blooms in August, and although plants may reach six feet at the rear of the border, staking is not required and established clumps need not be disturbed for many years.

Delphinium — Delphinium

Few plants can approach the modern strains of *D. elatum* for their bold effect in the border, but this is a decidedly finicky group and cannot be guaranteed as long-lived under normal conditions. One new strain called *D.* 'Connecticut Yankees' may well be the answer for those who would like to grow the Delphinium but cannot cater to its many whims. These come in an excellent color range, and form well-branched bush-type plants seldom over thirty inches tall and resembling species Delphiniums in habit. These were tried at the Arnold Arboretum for the first time last summer and although they were given almost no attention, excellent results were obtained. Undoubtedly they are more permanent than taller *Delphinium* hybrids, but we do not know at this point how long they will last under our conditions.

Dianthus — Pink, Carnation

This is another large genus which cannot receive much attention here. Some varieties are not very hardy and the group as a whole is disappointing throughout most of this country where summers are hot and dry.

A notable exception is the Cheddar Pink, *D. gratianopolitanus*, which understandably, is more frequently listed under the synonym *D. caesi*us. This has admirably survived exposed conditions in the Ground Cover Plots at the Case Estates. Its only fault is that it forms such a thick mat that portions die out from time to time and division must be resorted to. Plants form a dense, low mat of foliage with small fringed flowers in shades of pink borne on six-inch stems. *D.* 'Rose Queen' is an interesting selection with double bright-rose flowers.

Dicentra — Bleeding Heart, Lyre Flower, Dutchman's Breeches

For permanence the best of this group is *D. spectabilis*, the Bleeding Heart or Lyre Flower, which is a true aristocrat of the border for the short period when it is in bloom. A well-established plant forms a large clump with arching sprays of pink heart-shaped flowers in late May and June. It prefers a rich

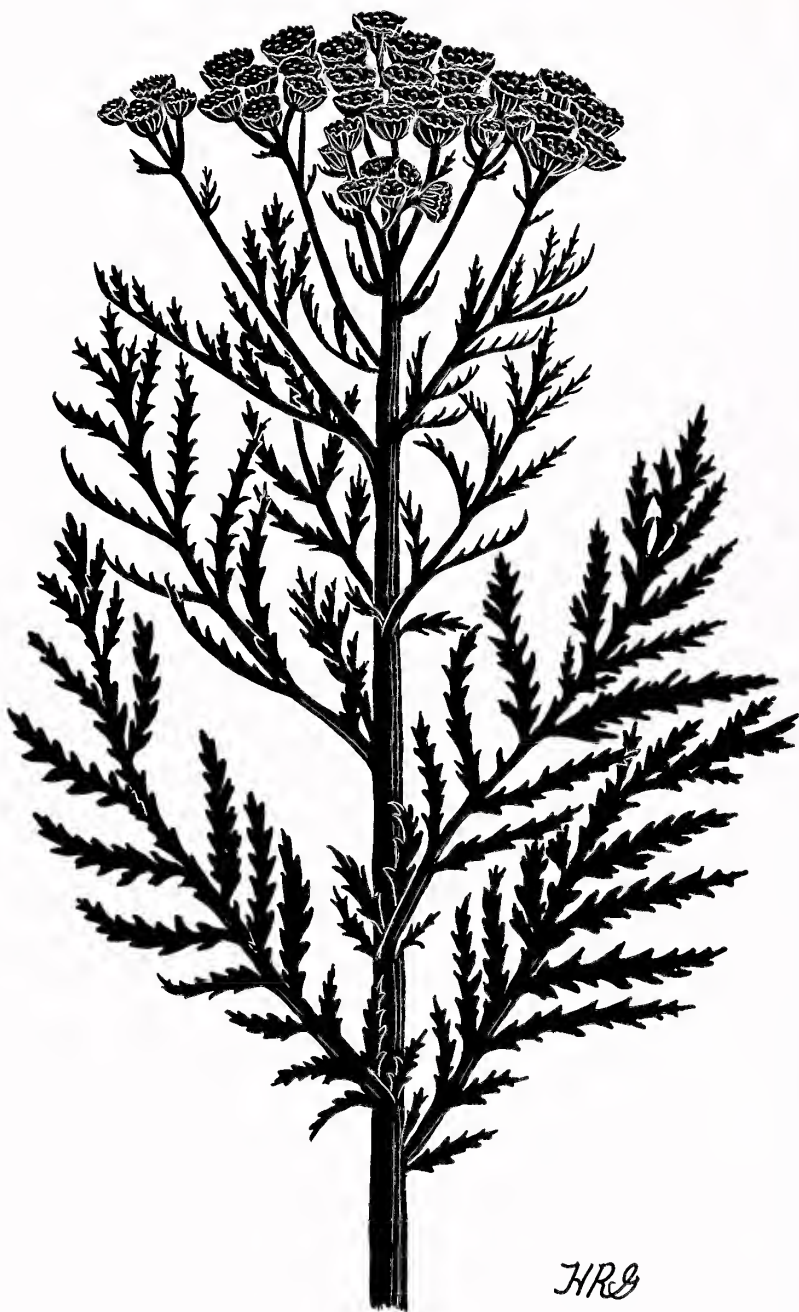
soil with a high organic-matter content and results are always best if light shade can be provided. Specimen plants are preferable to groupings because they take up a lot of room, and the foliage has a tendency to die down in the hot part of the summer, leaving a large gap in the border. This would be unfortunate were it not for the fact that *Gypsophila paniculata* (Baby's Breath) and its varieties can be used effectively nearby. By the time the Bleeding Heart is ready to disappear *Gypsophila* is ready to fill in the gaps. An alternative is to use the empty spaces for the planting of annuals. *D. spectabilis* var. *alba* is occasionally available. This has a very delicate constitution and is really not worth bothering with.

D. eximia is of great value for its long flowering period from May to August. The dissected leaves are grayish blue, remain attractive throughout the growing season, and make a good contrast to the pink flowers. Under normal circumstances it will have to be divided every third or fourth year. *D. eximia* 'Bountiful' is a relatively new cultivar said to be the result of a cross between *D. eximia* and *D. oregana*. Flowers are a deeper pink, almost fuchsia-red. All during the summer a few flowers are produced, but in the autumn it blooms almost as freely again as it did in the spring.

D. cucularia, Dutchman's Breeches, requires woodland conditions and is not a fitting subject for the herbaceous border.

To be continued

ROBERT S. HEBB



Weeds: A Link with the Past

3. Tansy

Tansy (*Tanacetum vulgare*) is a tall, robust, aromatic plant with cut leaves and deep yellow flowers, which brightens the meadow and stream edges of the Arboretum in July and August. It is a native of Europe, but was observed in North America in 1748 by the botanist and explorer Peter Kalm. Originally tansy was valued as a medicinal plant; a monk named Walahfrid Strabo mentioned it in 840 A.D. in a Latin poem:

The doctors use it for the power it has
A draught of it clears away as much blood inside
As the size of the dose you take of this nourishing brew.

John Gerard, in the 16th century, wrote that cakes were made of it in England in the spring, which were called "Tansies," and he commented, "Which be pleasant in taste and good for the stomacke."

William Coles reported in *The Art of Simpling* in 1656, "Wild Tansy laid to soak in buttermilk for nine days and then applied as a wash to the face has the reputation for making the complexion very faire."

A cookbook published in 1741, *A New and Accurate Treatise of Cookery etc. According to the Politest and most Improved Taste*, gives directions for an elaborate pudding called *A Tansy*. It contrasts markedly with our present-day cholesterol-conscious cooking:

Take twenty yolks, and eight whites of eggs, beat them well and strain them into a quart of thick cream; one nutmeg, and three naples-baskets [biscuits ?] grated, as much juice of spinach, with a little Tansy; sweeten it to your palate, then butter a dish well, and set it in an oven fit to bake custards; watch it, and when it is done take it out and turn it on a pye plate; scrape sugar and squeeze orange over it. Garnish the dish with orange and lemon and serve it up.

The name "Tansy" in many cookbooks of the eighteenth century appears to be a synonym for "pudding." In *A Collection of Above Three Hundred Receipts in Cookery, Physick and Surgery for the Use of all Good Wives, Tender Mothers and Careful Nurses* by "Several Hands," written in 1749, a recipe is given for a baked pudding containing milk, eggs, spinach juice and "As much sugar as will make it very sweet." It contains no tansy, but is titled, *A very good Tansy*. Another book of the same period gives directions for making *An Apple Tansy* which consists of fried apple slices in a sweetened and flavored omelette; and *A Gooseberry Tansy* which is similar but uses gooseberries.

However, the use of the plant as a medicine and a household item continued; it was used to get rid of intestinal worms and to treat gout; it added color and flavor to cheese; and was rubbed into meat to ward off the attacks of the fleshfly. As late as 1819 directions for planting tansy were included in the *Practical American Gardener*.

But our modern tastes do not appreciate the strong honest flavors of the past and tansy is no longer needed by *Good Wives, Tender Mothers and Careful Nurses*.

Helen Roca-Garcia

Summary of weather data recorded at the Dana Greenhouses
October, November and December 1970.

	Precipitation	Average Daily Temp.
October	2.81	65.2
November	4.54	52.2
December	6.13	25.2

Arnoldia Reviews

Wild Flowers of Greece, paintings by Niki Goulandris, text by Constantine N. Goulimis, edited by W. T. Stearn.

Visitors to Greece return to their homes with unforgettable memories of the beauty of the architectural treasures of a past era, and enthusiastic over the natural loveliness of the native wild flowers. This handsome volume indicates clearly that the wild flowers are equally appreciated by some local citizens. Constantine N. Goulimis, a successful lawyer, spent the last twenty years of his life collecting specimens of native plants and compiling notes on them. Mrs. Niki A. Goulandris, an extremely talented artist of Athens, has painted many of the specimens Mr. Goulimis gathered. Life-sized reproductions of 103 species are included within this volume. Dr. William T. Stearn of the British Museum (Natural History) revised and edited the text; and the volume has been issued as the first publication of the Goulandris Botanical Museum, an institution formed to further studies of the Flora of Greece. Sir George Taylor of the Royal Botanical Gardens, Kew, has written an introduction including a brief historical summary of studies of the plants of Greece and of the collaboration of British botanists with local scholars. The multiple collaboration resulted in a splendid reference volume sure to charm the browser, offer botanical information to the professional botanist, and direct the tourist to the right time and the right place to see the wild flowers of Greece at their best.

The decision to prepare a series of illustrated volumes on the flora of Greece was made in 1954. During the next nine years the collector worked closely with the artist to coordinate botanical notes with paintings of living plant materials. The accuracy and beauty of the illustrations reveal that a mutual understanding was achieved. The text was unfinished at the time of Dr. Goulimis' death, and Dr. Stearn explains his role as editor in his preface to the volume. The author decided that formal descriptions were not necessary since the paintings were life size, and as references would be given to standard floras published through 1934. For the new species described from Dr. Goulimis' collections, or published subsequent to 1934, the editor has republished the original description, in Latin, so that Wild Flowers

of Greece is in a sense an illustrated supplement to the basic botanical description.

A paragraph on the distribution of each species offers not only the location and altitude but the flowering period as well. The text accompanying the plates commonly makes reference to monographs or the pertinent comments of other authors. The nomenclature and arrangement of the *Flora Europea* has been adopted for families already treated. Many of the plants illustrated are in cultivation in Europe and in the United States, and the reference to Gardener's Chronicle and the Botanical Magazine are welcome as these often supply cultural information.

In a work of this excellent visual appeal the author's opening statements are often read quickly if at all. In this volume they form a major contribution. This is not only a personal account of some 220 expeditions representing journeys of over 200,000 miles and the ascent of over 70 mountains on the mainland and the islands of Greece, but an excellent phytogeographic account of the area where many of these unusual species occur. Dr. Goulimis calls them "botanical paradises" and his enthusiasm is contagious.

Greek history and mythology play a role in the origin of plant names and the uses of plants. The author frequently includes such information in the introduction or the commentaries on species.

For those individuals interested in the preservation of wild flowers Dr. Goulimis offers pertinent observations on the results of their protection in Greece. The area around Mt. Athos, where 20 endemic species occur, received its initial protection from grazing animals in a ruling of the Emperor of Byzantium, Vasilius the Macedonian, who ruled from 866 to 886 A.D. This may be therefore the world's oldest established wild flower sanctuary.

Wild Flowers of Greece is a folio volume not convenient for transport in the field. Perhaps someday the Goulandris Botanical Museum or the distributors will consider a volume of reduced page size which could be enjoyed in the field and used for identification.

R.A.H.

Goulimis, Constantine N., and Goulandris, Niki A., edited by W. T. Stearn, *Wild Flowers of Greece*. Kifissia, Greece, The Goulandris Botanical Museum, 1970. Distributed by Academic Press, New York. xxxii + 214 pages, 103 plates in color (un-numbered), folio, index. \$40.00.



ARNOLDIA

The Arnold Arboretum / Vol. 31, No. 2 / March, 1971

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ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Mass. 02130

*Published six times a year: on the 15th of January,
March, May, July, September, and November
Subscriptions: \$3.50 per year. Single copies, 60 cents*

*On the cover: Forsythia x intermedia 'Spectabilis' at the
Arnold Arboretum. Photo by P. Bruns.*

The Story of Forsythia

It is difficult to imagine what the spring garden must have been like without the Forsythias, but it is of interest to note that no *Forsythia* species was common in cultivation until about 1850 and it was not until 1908 that the first really outstanding horticultural variety was imported into this country. Because of their ability to produce an abundant display of bright color so early in the season, few groups of shrubs have risen to favor as quickly as the Forsythias. The only other hardy early flowering shrubs that have yellow flowers are *Cornus mas*, the Cornelian Cherry; *Lindera benzoin*, Spice Bush; and *Dirca palustris*, Leatherwood. Delightful as each of these may be, none can match the bright display which most of the Forsythias produce.

The following account is an attempt to describe the various species and cultivars of *Forsythia* which have played a role in the development of our current garden varieties, and also to describe a number of the best ones which are easily available on the market today. Some varieties, of interest only in botanical collections, have been omitted from this discussion as well as a few cultivars currently available which will probably never become popular.

Forsythia x intermedia and its cultivar 'Spectabilis' have played an important role in the development of many varieties. These are excellent garden plants, but it is felt by the authors that much more needs to be done. Larger, more attractive flowers should be developed; greater hardiness should be bred into future varieties probably using *F. ovata*; and forms with a more graceful habit of growth would be a welcome addition using a variety such as *F. suspensa* var. *sieboldii* as a starting point. Dwarf shrubs are in great demand today and in *Forsythia* we have only *F.* 'Arnold Dwarf,' a good ground cover but with washed out flower color and sparse bloom; *F. viridissima* 'Bronxensis,' which flowers well but is difficult to propagate and grow; and *F. x. intermedia* 'Nana,' another plant with poor, greenish-yellow flowers. Even though the story of our garden Forsythias is a long one, several more chapters are undoubtedly waiting to be written.

Forsythia suspensa (Thunberg) Vahl, Enum. Pl. 1: 39. 1804.

Between August 1775 and November 1776 Carl Pehr Thunberg, a pupil of Linnaeus, visited Japan as a member of the Dutch Embassy to the Imperial Court at Tokyo. Some years later, in 1784, he published a *Flora Japonica* which included about 1000 species which he had collected on his trip, including many cultivated plants. One plant in particular, and the one in which we are interested, he called *Syringa suspensa*. This was a deciduous shrub with slender weeping branches which produced quantities of yellow flowers in April, before the leaves began to grow.

According to P. J. van Melle, a catalog published in 1817, of a garden maintained by Christian August Breiter in Leipzig, lists the name *Syringa suspensa*. We suppose that this is the plant that Thunberg described, but how or when it got to Leipzig we have no idea.

In 1804 Martin Vahl, Professor of Botany at Copenhagen, recognized that Thunberg's plant was not a lilac and established the genus *Forsythia* for the plant. The genus commemorates William Forsyth, who was at that time Director of the Royal Garden at Kensington.

From 1825 to 1830 Philipp Franz von Siebold was living in Japan as an employee of the Dutch government. He too studied many Japanese plants, native and cultivated, and on his return to Holland he (with Joseph Gerhard Zuccarini) prepared a *Flora Japonica*. In this work he published a colored illustration of *Forsythia suspensa*, indicating that it was known only in cultivation, and noted that there were two forms, one with slender, weeping stems and the other with stouter, more erect and spreading stems. In 1833 Verkerk Pistorius is said to have imported living plants to Holland where they were apparently cultivated for the next twenty years.

In 1857 *Forsythia suspensa* var. *sieboldii* was flowered in England at the Veitch Nurseries. This is the form of the species with long, slender, pendant branches which is effective when planted in such a way that it may trail over walls. The shrub grows to 6 feet tall, the stems are arching and become 10-12 feet long. The flowers are slightly larger than *F. viridissima*, being about an inch long (2.5 cm.), clear yellow without a tinge of green, and borne singly. In 1864 the erect form of the species, *Forsythia suspensa* var. *fortunei*, was introduced, with spreading (not weeping) branches. The flowers are either solitary or as many as 6 together. The leaves are frequently 3-lobed or 3-parted, and the corolla lobes are narrow

and generally twisted. The Arnold Arboretum received cuttings of *Forsythia suspensa* from Francis Parkman, the historian, in 1876.

Forsythia viridissima Lindl., Jour. Hort. Soc. 1: 226. 1846.

In 1844 or 1845 Robert Fortune, on his first trip to China sponsored by the Horticultural Society of London, found a *Forsythia* cultivated in a Chinese garden. He sent material to London and John Lindley, the Assistant Secretary of the Horticultural Society, described it in the first volume of the *Journal of the Horticultural Society* as *Forsythia viridissima*. At this time he quoted Fortune's notes as follows:

This is a deciduous shrub with very dark green leaves, which are prettily serrated at the margin. It grows about 8 or 10 feet high in the north of China, and sheds its leaves in autumn. It then remains dormant like any of the deciduous shrubs of Europe, but is remarkable for the number of large prominent buds which are scattered along the young stems produced the summer before. Early in spring these buds, which are flower-buds, gradually unfold themselves, and present a profusion of bright yellow blossoms all over the shrub, which is highly ornamental. I first discovered it growing in the same garden with *Weigela rosea*, which, I have said in another place, belonged to a Chinese Mandarin, on the island of Chusan, and was generally called the Grotto Garden by the English. Like the *Weigela* it is a great favourite with the Chinese, and is generally grown in all the gardens of the rich in the north of China. I afterwards found it wild amongst the mountains of the interior in the province of Chekiang, where I thought it even more ornamental in its natural state amongst the hedges than when cultivated in the fairy gardens of the Mandarins.

For twenty years or more *Forsythia viridissima* was the only *Forsythia* in cultivation in Britain and in the United States. Today it is rarely seen. It forms an erect branching shrub four to nine feet tall; the flowers are a little less than an inch long (2–2.5 cm.), yellow tinged with green, and borne singly or two together. It is hardy to Zone V (Massachusetts and southern New York State as far north as Albany). The Arboretum obtained seed of *Forsythia viridissima* from the garden of Charles Sprague Sargent in 1874.

Forsythia viridissima 'Bronxensis' Everett Gard. Chron. Am. 51: 296. 1947.

F. viridissima 'Bronxensis' is difficult to propagate and for that reason not many nurserymen offer it. At the time the plant was first described, it was growing at the New York Botanical Garden where no record of its origin had been kept. It was later found that the Botanical Garden had received its plant from the Boyce Thompson Arboretum, Yonkers, N.Y., where it was grown from seed received from the Imperial University Botanic Garden of Tokyo, Japan, in 1928 as *F. koreana*. Three plants developed from these seeds, two of which were *F. viridissima* var. *koreana* and the third a dwarf seedling.

F. viridissima 'Bronxensis' is a true dwarf, ten-year-old plants being little more than a foot high and two feet in diameter. It blossoms freely, unlike *F. 'Arnold Dwarf,'* but although the outer branches are somewhat spreading, they do not root into the ground at their tips as *F. 'Arnold Dwarf'* does, and it cannot be used as a ground cover. It is, however, a very fitting subject for the rock garden.

Forsythia x intermedia Zabel, in Gartenflora 34: 35. 1885.

In the summer of 1878 Hermann Zabel, Director of the Municipal Garden in Munden, found seedling Forsythias in the Botanic Garden of Gottingen which were apparently the result of a cross between *F. viridissima* and *F. suspensa* var. *fortunei*. He described this, in 1885, as *Forsythia x intermedia*. This hybrid has been the source of many garden forms. Its value lies in its being somewhat hardier than either parent, being hardy through much of New Hampshire, Vermont and up-state New York. In habit it is similar to *Forsythia suspensa* var. *fortunei*. The Arboretum received its first plant of this hybrid in 1889. *Forsythia x intermedia* is of importance today because it has yielded a series of selections, and hybrids between those selections which are among the most useful of contemporary Forsythias.

Forsythia x intermedia 'Vitellina' Koehne, in Späth Nurs. Cat., Berlin, Germany. 1899.

Beginning in 1899 a number of selections were made at the Späth Nurseries, Berlin, Germany, from seedlings of *F. x intermedia*. *Forsythia x intermedia* 'Vitellina' was offered for sale in the same year, thus starting the parade of new cultivars which are characterized as having more upright and vigorous

growth than their "ancestor," *F. suspensa* var. *fortunei*, and larger and more profuse flowers than either *F. suspensa* or *F. viridissima*. *Forsythia* 'Vitellina' is noted for having the smallest flowers (3.6 cm. diameter) in this general group of hybrids and although these are deep yellow, the cultivar is not in general cultivation today.

Forsythia x intermedia 'Densiflora' (Koehne) Schelle, in Beissner, et al., Handb. Laub.-Ben 413. 1903.

Forsythia x intermedia 'Densiflora' was introduced in the same year as *F. 'Vitellina'* by Späth and proved popular for a number of years because of its profuse flowers. It has spreading and pendulous branches, like *F. suspensa*, and crowded, pale yellow, rather flat flowers with slightly recurved corolla lobes. Its parentage is the same as 'Vitellina.'

Forsythia x intermedia 'Spectabilis' Koehne in Gartenflora 55: 227. 1906.

The next introduction from Späth in 1906 was *F. 'Spectabilis'* and it is the one cultivar in the series from that nursery which has remained extremely popular to the present day. Combining the stiffer habit of *F. viridissima*, with the more profuse flowering of *F. suspensa* var. *sieboldii*, it is especially noted for its display of large vivid yellow flowers which are one-and-a-half inches across, and are produced in clusters.

Never before had any *Forsythia* produced as many or such deeply colored flowers as this new hybrid selection. After sixty-five years, during which many other varieties have come on to the market, *Forsythia x intermedia* 'Spectabilis' remains the standard for any new cultivar to better when it comes to critical comparisons.

Forsythia x intermedia 'Primulina' Rehder, Mitt. Deutsch. Dendr. Ges. 1912 (21): 193. 1913.

The story of the *Forsythias* switched next to the other side of the Atlantic, to the Arnold Arboretum, where in 1912 Alfred Rehder observed a chance seedling growing in a mass planting of *Forsythias* on Bussey Hill. It was propagated and named *F. 'Primulina.'* Of much the same habit as *F. 'Spectabilis,'* it is a selection from *F. x intermedia* but in this case the flowers are pale-yellow. It was much admired by those who objected to the "brassy" tones of *F. 'Spectabilis,'* but is seldom grown outside of botanical collections now that the following cultivar is easily available.

Forsythia x intermedia 'Spring Glory' Wayside Gardens Cat., Mentor, Ohio. 1942.

Mr. M. H. Hovarth of Mentor, Ohio, discovered 'Spring Glory' in 1930 as a branch sport on a plant of *F. x intermedia* 'Primulina' which grew in his garden. He noted one branch consistently produced larger and more densely arranged flowers than the others on the bush. Cuttings taken from this branch produced plants which were far superior to *F. 'Primulina'*, and about 1942 it was introduced into the trade by Wayside Gardens, Mentor, Ohio, as *F. x intermedia* 'Spring Glory.' It is still one of the leading varieties on the market today, and well worth growing by those who object to the color of *F. x intermedia* 'Spectabilis.'

Forsythia x intermedia 'Lynwood' G. E. Peterson, Jour. Roy. Hort. Soc. 82: 127. 1957.

The next sport to be found on a plant of *F. x intermedia* 'Spectabilis' occurred in a garden in Northern Ireland called Lynwood. The owner, Miss Adair, noticed a branch on her plant that had flowers which were more open and better distributed along the stem than those on the rest of the plant. The Slieve Donard Nursery of Newcastle, Northern Ireland, took cuttings from the branch and introduced it about 1935. It is called *F. 'Lynwood'* in honor of the garden where it originated. The flowers are brilliant yellow and slightly lighter than *F. x intermedia* 'Spectabilis.' Although the plant is possibly a bit stiff in habit of growth, in flower it is without doubt one of the best. By 1949 the cultivar had reached America where nurserymen called it 'Lynwood Gold,' a name thought to have greater appeal. Unfortunately, it still appears in catalogs under this incorrect name.

Forsythia x intermedia 'Arnold Giant' Sax, *Arnoldia* 7: 10. 1947.

Until the 1940's the main role played by the Arnold Arboretum in the story of the Forsythias was that of the original importer of some species and cultivars into the United States. About this time Dr. Karl Sax, Director of the Arnold Arboretum, and certain of his students became interested in the breeding of Forsythias, and particularly in the treatment of seedlings with a colchicine emulsion in an attempt to produce tetraploid plants. By producing tetraploid cells (which contain double the ordinary number of chromosomes) in the growing point of a young plant, entire plants can be developed which have two





*Figs. 2 and 3: Typical habitat for Forsythia, Kongo-san, Korea.
Photos: E. H. Wilson, 1918.*

times the normal chromosome number. In many instances such plants have more vigor and larger flowers. *Forsythia* 'Arnold Giant' was developed in this manner from a seedling of *F. x intermedia* 'Spectabilis.' It has thicker leaves, larger and darker flowers, and is more erect in habit of growth than *F. x intermedia* 'Spectabilis.' Although offered by some nurserymen, it has never proved popular in this country as it is too rigidly upright and difficult to place correctly in the garden. It is also difficult to root from cuttings, an objectionable characteristic for a *Forsythia*.

Forsythia x intermedia 'Tremonia'

In 1966 the Arnold Arboretum obtained a new cultivar of *Forsythia x intermedia* called 'Tremonia' from Mr. Gerd Krussman of the Dortmund Botanic Garden, Dortmund, West Germany. Although it is too early to predict the habit of growth or flower production of our specimens, young plants in the nurseries produced flower buds for the first time last fall. The plants are of immediate interest, moreover, because of the deeply cut leaves, giving it the most interesting foliage of all the *Forsythias*. Young plants and hardwood cuttings were released by the Arnold Arboretum to the nursery trade in 1969 and it is hoped that within a few years *Forsythia x intermedia* 'Tremonia' will be available commercially.

Forsythia europaea Degen and Baldacci, in Oestr. Bot. Zeitschr. (1897): 406.

In 1897 a new species of *Forsythia* was discovered in Albania. Seed was immediately distributed and by 1904 seedlings were flowering in various public and private gardens. The story was set out by Otto Froebel, a nurseryman of Zurich:

It may be regarded as a most interesting phenomenon that in our days an entirely new shrub should have been found in Europe, the existence of which no one had any idea of and the family of which had hitherto only been known in Japan and China.

This was only rendered possible through this European species having its home in a part of the Balkan Peninsula in Albania, which has hitherto been comparatively unexplored on account of the danger and difficulty of the journey and the absence of any accommodation. I was indebted to the kindness of Dr. A. von Degen in Budapest for a small packet of the seed collected by him in October

1899, from which I was able to raise a few plants. Thanks to careful attention the seedlings thrived well, and by the autumn of 1902 they had grown to be fine, strong bushes 8 feet and more high; and to my surprise, and contrary to all expectation, one single plant, in 1904, produced a small number of blooms scattered over two year old wood, but unfortunately it was not observed until too late. I sent the already half-bloomed spray to Herr Beissner in Bonn, but he could not use the material for further investigation.

Forsythia europaea is a stiff upright shrub 6 feet or more tall. The flowers are generally solitary, or two or three together, a little less than one inch long (2 cm.) and pale yellow in color. Although it is about as hardy as *F. suspensa* it is not a particularly ornamental species, and is seldom found outside of botanical collections. The Arnold Arboretum received seed of this new species from A. K. Bulley in 1900.

Forsythia giraldiana Lingelsh., in Jahresb. Schles. Ges. 1908, lxxxvi. 1 (1909).

In 1897 G. Giraldi collected a *Forsythia* in North Shensi, China. The material was not in flower, but fruits were present. The dried specimens were studied by Alexander Lingelsheim who determined that the plant was related to, but differed from, *F. viridissima*. He published a description based on the dried specimens and the collector's notes and called the plant *Forsythia giraldiana*. In 1914 Reginald Farrer collected seeds of the same species in Kansu, China.

Forsythia giraldiana is an upright shrub up to twelve feet tall. The flowers are yellow, borne singly, a little less than an inch long (1.6–2.1 cm.) and it is one of the earliest of *Forsythias* to flower. It is as hardy as *F. suspensa* but not so ornamental. The Arboretum obtained material of this species in 1938.

Forsythia japonica Makino, in Bot. Mag. Tokyo xxviii: 105, Fig. IV. 1914.

In the first part of the twentieth century plant exploration in eastern Asia produced quantities of interesting plants. In 1914 Tomitaro Makino, Lecturer in Botany in the Imperial University, Tokyo, described a *Forsythia* collected in the mountains in the Province of 'Bitchu' which is in southwest Honshu, between Hiroshima and Kyoto (it is now the Chugoka District). This is a relatively small-flowered species, the flowers only a little more

than one-half an inch long, (1.5 cm.). He called it *Forsythia japonica*, and it is the only species of the genus native in Japan.

Forsythia ovata Nakai in Bot. Mag. Tokyo xxxi: 104. 1917.

In 1917 Takenoshi Nakai collected fruiting material of a *Forsythia* in the Diamond Mountains of Central Korea (just inland from the eastern coast and bisected now by the boundary between North and South Korea) and published a description of *Forsythia ovata* in 1917. In that same year E. H. Wilson collected seeds of the species in the same location and in 1923 Alfred Rehder published a description of the flowers based on plants raised in the Arnold Arboretum. *Forsythia ovata* makes a stiff spreading shrub 4 to 6 feet tall. The flowers are small, less than 1 inch long (1–1.5 cm.) and “butter yellow.” Its great virtue is its hardiness (to Zone IV) and the fact that it is the earliest *Forsythia* to come into bloom.

Forsythia japonica Makino var. *saxatilis* Nakai, in Bot. Mag. Tokyo xxxiii: 10. 1919.

In 1919 Nakai described another *Forsythia* from specimens collected near Seoul, Korea, a small shrub 3 feet tall, with small flowers. Its only claim to fame is that it is one parent of *Forsythia* ‘Arnold Dwarf.’ Nakai originally considered this to be only a variety of *Forsythia japonica*; however in 1921 he decided that it was sufficiently different from that species to be considered a species in its own right. Further study by Rehder suggests that Nakai’s original disposition was the correct one, and it is now generally referred to as *Forsythia japonica* var. *saxatilis*.

Forsythia viridissima Lindley var. *koreana* Rehder, in Jour. Arn. Arb. 5: 134. 1924.

Exploration in Korea continued and in 1924 Rehder described another of Wilson’s introductions as *Forsythia viridissima* var. *koreana*. In 1923, Nakai, in the course of a study trip to the United States, visited the Arnold Arboretum and discussed this plant among others with Rehder and Wilson. In 1926 he published a description of it and raised it to specific rank saying: “This Korean species is one of the most decorative among the *Forsythias*.” It is a large shrub, up to 12 feet high, with flowers about the size of *F. ovata*.



Fig. 4: Forsythia x intermedia 'Arnold Giant.'

Forsythia mandschurica Uyeki in Jour. Chosen Nat. Hist. Soc. 9: 21. 1929.

Homika Uyeki described a plant from Mt. Keikwan, Manchuria, as *Forsythia mandschurica* in 1929. This is said to be similar to *F. japonica* and *F. saxatilis* but little more is known of it. So far as we know it is not in cultivation.

Forsythia nakai T. B. Lee, Ill. Woody Pl. Korea: 330. 1966.

The next year, 1930, Nakai described a plant which he called *Forsythia densiflora* based on specimens collected growing on calcareous rocks on Mt. Chojusan in the Province of Kokai in Korea. Nakai thought it would be a good garden plant, but it apparently has not been used in cultivation. It should be noted that the name *Forsythia densiflora* had already been used for an entirely different plant, so that Nakai's name cannot stand. In 1966 T. B. Lee, of the Forest Experimental Station at Seoul, Korea, published the new name *Forsythia nakai* for this plant, and this is the name that must be used henceforth.

Hybrids

Because of the value of Forsythias as garden plants, a number of hybrids have been made, although relatively few aside from *Forsythia x intermedia* have proved superior to selections from the species. *Forsythia x intermedia* has already been mentioned. In 1935 a cross between *Forsythia europaea* and *F. ovata* was raised in the Arnold Arboretum. We still have a plant of this cross, but it is not particularly ornamental. In 1965 Z. Katedry Roslin Ozdobnych described two hybrids raised in Poland — *Forsythia x kobenzae* (*F. europaea* x *F. suspensa*) and *F. x variabilis* (*F. ovata* x *F. suspensa*). Unfortunately we do not have specimens and so are in no position to evaluate these plants.

The best known hybrids are those which were produced by Professor Karl Sax at the Arnold Arboretum. *Forsythia* 'Arnold Giant' is a seedling of *F. x intermedia* whose chromosomes were doubled by treatment with colchicine in 1939. This has stiff erect stems, with thick, large leaves and flowers one inch long, but is difficult to propagate. It was crossed back to *F. intermedia spectabilis* and in 1944 a large population of seedlings was produced. One of these (which is no longer in cultivation) was a triploid and was named *F. 'Beatrix Farrand.'* Another clone, a tetraploid, was named *F. 'Karl Sax'* by Joab L. Thomas

in 1960. There are still a number of these seedlings growing in the Arnold Arboretum. They have become large, massive plants, six to eight feet tall with relatively large flowers. A number of clones from this cross were distributed, and since there has arisen a confusion over the name 'Beatrix Farrand,' we propose the following:

The progeny of the cross *Forsythia* 'Arnold Giant' x *Forsythia intermedia* 'Spectabilis' shall receive the group name (Farrand Hybrids). Within the group two cultivars (clones) have so far been named:

- 1.) *Forsythia* (Farrand Hybrids) 'Beatrix Farrand,' Wyman, Arnoldia 19: 12. 1959.

This triploid cultivar was the result of a cross made by Dr. Sax and his students between *F.* 'Arnold Giant' and *F. x intermedia* 'Spectabilis.' It is described as being upright and dense in habit, producing dense clusters of flowers which are slightly darker than those of *F. x intermedia* 'Spectabilis.' Its name honors Mrs. Beatrix Farrand, a well-known landscape architect who served as landscape consultant to the Arnold Arboretum for several years. This clone apparently is not in the trade. All of the plants with this name that have been examined cytologically have proved to be tetraploids.

- 2.) *Forsythia* (Farrand Hybrids) 'Karl Sax' J. L. Thomas, Arnoldia 20: 49. 1960.

This clone was later selected and named *F.* 'Karl Sax' in recognition of Dr. Sax's work with the group. It is a moderately compact shrub, the branches not being as rigidly erect as those of *F.* 'Arnold Giant.' The deep yellow flowers are profuse and large, up to 4.5 cm. across. It is easier to root from cuttings than *F.* 'Arnold Giant' and is hardier than many other cultivars.

We recommend that all *Forsythias* in the trade now called 'Beatrix Farrand' be designated *F.* (Farrand Hybrids) and that each grower, if he feels his clones warrant it, register a new cultivar name.

Another of Dr. Sax's hybrids is *Forsythia* 'Arnold Dwarf' Sax, Arnoldia 7: 10. 1947. This *Forsythia* is grown not for its flowers, but because of its value as a ground cover. It originated at the Arnold Arboretum in 1941 as the result of a cross which Dr. Sax made between *F. x intermedia* and *F. japonica* var. *saxatilis*. It is a low-growing shrub, old specimens seldom reaching over three feet in height. Young branches root readily when

they come in contact with moist soil, and in the process they droop to form a dense mat of foliage. The flowers are very sparingly produced, and when observed are pale greenish-yellow and of no value from an ornamental standpoint. The great versatility of *Forsythia* 'Arnold Dwarf' as an unusual ground cover, even under somewhat difficult conditions, more than makes up for this latter defect.

Floral Dimorphism

Forsythias exhibit an interesting form of floral dimorphism. Some plants have styles as long as, or longer than, the tube of the corolla, and others have the style only as long as the calyx, or shorter. This is a structural adaptation to prevent or reduce self-pollination. The phenomenon has been studied in *Primula* where it has been determined that pollination of long- and short-styled flowers gives significantly better seed production than self-pollination.

Culture

Forsythias are among the easiest of all our hardy shrubs to grow. Mass plantings in the Arnold Arboretum have been placed on steep hillsides where the soil is poor and very dry in the summer. Despite this, our plants have flourished for a number of years and blossom well, except when an unusually severe winter destroys the flower buds. Forsythias have been reported to tolerate both acid and alkaline soil conditions, and do especially well when given an annual application of a 5-10-10 fertilizer. They will also flower when planted in slightly shady conditions, but a sunny position will insure better ripening of the wood in late summer, a condition which relates directly to the ability of plants to withstand periods of severe cold in the winter. One of the few soil conditions which Forsythias will not tolerate is one in which excessive moisture surrounds the roots for any period of time.

With the one exception of *F. viridissima*, which is the least hardy of the common forms, all Forsythias in cultivation are reliably hardy in the Boston area, but not much further north except along the sea coast of New Hampshire and southern Maine. A few species and cultivars, namely *F. ovata*, *F. ovata* 'Robusta,' *F.* 'Arnold Giant,' and *F.* 'Karl Sax,' are reported as being able to withstand colder conditions which roughly approximate to Zone 4 of the Arnold Arboretum Plant Hardiness Zone Map; that is, southern Maine, southern New Hampshire, southern Vermont, and most of New York State. Probably the hardi-



Fig 5: Top: left: *F. japonica* var. *saxatilis*
 right: *F. suspensa* var. *fortunei*
 Center: left: *F. ovata*
 right: *F. suspensa* var. *sieboldii*
 Bottom: left: *F. x intermedia* 'Spectabilis'
 right: *F. europaea*



est of all is *F. ovata* and its cultivar *F. ovata* 'Robusta.' This latter plant flowers much more freely than the type and should be tried in areas where other varieties have not been successful or where *F. ovata* has been disappointing due to its rather shy flowering habits. *F. europaea*, the species from Albania, is extremely hardy, too, but because of its ungainly upright habit of growth it is not popular. *F.* 'Karl Sax' has not been in cultivation long enough for us to make a proper assessment of its hardiness, but it has been reported as being nearly as hardy as *F. ovata*.

The above discussion has been concerned with the ability of certain species or varieties to survive more extreme cold than others, but unfortunately still another factor enters the picture with Forsythia — namely bud hardiness. During some winters temperatures are experienced which, although not cold enough to kill the plants, will injure flower buds to such an extent that blossoming may be either reduced somewhat or almost entirely eliminated the following spring. These conditions can occur when temperatures drop below -15° F as determined by Robert Mower and his students at Cornell. Flower buds of the hardier varieties listed above are generally less affected, and it is of interest to note that *F. ovata* and *F. ovata* 'Robusta' flower well at the Arnold Arboretum when exceedingly harsh winters have killed the flower buds of other Forsythias.

When planting Forsythia it must be remembered that they will form specimens six feet tall and eight feet wide, and too often we see them severely cut back or sheared into nearly topiary form in an attempt to confine them into a small space. However, they will grow vigorously and flower even under this treatment. Ernest H. Wilson once wrote (Arn. Arb. Bull. Pop. Inf. Ser. 3, Vol. 11. 1928):

. . . one of the tragedies of spring is the brutal way in which these good-natured shrubs are clipped and sheared at the annual tidying up of the garden. As one travels through the suburbs and countryside decapitated bushes

Fig. 6: Top: 1. *F. ovata*

2. *F. europaea*

3. *F. x intermedia* 'Nana'

4. *F. suspensa* var. *sieboldii*

5. *F. x intermedia* 'Spectabilis'

Bottom left: *F. x intermedia* 'Spectabilis'

right: *F. x intermedia* 'Arnold Giant'

Bottom right: *F.* 'Karl Sax'

of Forsythias are to be seen on either hand despite the obvious fact that every branch cut from them in early April means a loss of flowers. If people would only wait and enjoy the crop of blossoms and then cut the Forsythia bushes back as severely as circumstances or fancy dictates, no harm would be done. Like other spring flowering shrubs and trees Forsythias produce their blossoms on the past season's growth and the pruning of all these plants should be done immediately after the blossoms have fallen. It is surprisingly difficult to get people to appreciate or at least to practice this simple fact.

On this same theme, Donald Wyman once wrote: (Arn. Arb. Bull. Pop. Inf. Ser. 4, Vol. 5. 1937):

Unfortunately many public plantings of Forsythias are sadly mutilated because of lack of intelligent care in pruning. Forsythias should be given plenty of room in which to grow and expand. They should not be crowded closely together for any reason except to make a good, dense bank planting where the whole object is to cover the ground. Many times when a single bush is used, it will be placed only two or three feet from a walk when actually it should be placed 8 to 10 feet from the walk, in order to give the plant plenty of room to expand fully at maturity. If the plants are pruned from the side, this necessarily cuts off the lovely drooping branches and spoils the entire effect, leaving only the unsightly base and a few branches ending prematurely in mid-air when they should be allowed to arch gracefully to the ground.

In fact, it is best to prune Forsythias as little as possible. Varieties of *F. x intermedia* seem to flower best on growth of two to three years, and when pruning must be done, only the older branches and dead wood should be removed to ground level. One should not leave stubs nor cut branches half-way back. In a very old planting where much dead wood occurs and drastic measures must be resorted to, entire plants can be cut back to the ground. The vigorous young shoots which result will be flowering well in a few years.

Forsythias can be used against walls and fences, as espaliers, or as informal hedges. The graceful *F. suspensa* var. *sieboldii*, with its long trailing stems has been used as an espalier or trained up over pergolas. A few striking examples can be seen in the Boston area where plants of this species have been

placed in such a way that their branches hang down and cover high walls along roadsides. One such example can be seen along the Arborway close to the Forest Hills gate of the Arnold Arboretum.

Few problems are encountered with insects or diseases on Forsythias. The only insect known to cause problems is the four-lined plant bug, *Poecilocapsus lineatus*, which makes characteristic tan circles in the leaves. When the insects begin to feed plants should be sprayed with Malathion. Leaf-spots occasionally occur due to the presence of one or several fungi (*Alternaria* sp., *Phyllosticta discincola*, *P. forsythiae*, and *P. terminalis*). Infected leaves can be picked off and burned or a copper spray can be used. Stem-Gall is another fungus disease (*Phomopsis* sp.) which causes abnormal nodular growths similar in appearance to the bacterial crown-gall disease or galls caused by insects. When severely attacked, whole branches die back and the bushes can look unsightly after the leaves have fallen. The best control is to cut off and burn all branches that bear the galls. Die-back is caused by a fungus (*Sclerotinia sclerotiorum*) which enters the plant via the flowers and flower stalks, and then grows into the twigs and kills them for some distance. The best control is to remove and burn all dead twigs and stems.

Buds on the Forsythias are fully formed by autumn. Every few years when we experience an unusually mild spell towards the end of autumn such weather induces some to break their dormancy and open. This is a normal occurrence (it also happens with such groups as *Chaenomeles*, *Lonicera*, and even with a few varieties of *Syringa*), but at such times we can expect to receive at the Arboretum telephone calls from a number of people who wish to report this "strange phenomenon."

GORDON P. DEWOLF
ROBERT S. HEBB

Appendix

1. Forcing Cut Branches

In preparation for a flower show in 1955, Mr. Roger Coggeshall, then Propagator at the Arnold Arboretum, kept a record of the length of time it took to force branches of certain shrubs which were collected at various dates (see *Arnoldia* 15: 2. 1955.) These were forced in a greenhouse where night temperatures were maintained at 55°–60°F. The figures he kept for two species of *Forsythia* give an indication of the number of days it should take for those who may wish to force cut branches in the home.

	No. of days to bloom:		Date of normal bloom out-of-doors
	cut Jan. 28	cut Mar. 18	
<i>Forsythia ovata</i>	18	8	April 5
<i>Forsythia suspensa</i>	20	6	April 15

2. Bibliographic list of varieties which have never been popular, illegitimate names, and synonyms (see Wyman, *Arnoldia* 21:6. 39-42. 1961).

Forsythia x *intermedia* (*suspensa* var. *sieboldii* x *viridissima*) (Zabel in *Gartenflora* 34: 35. 1885).

'Arnold Brilliant' (Tingle Nurs. Cat., Pittsville, Md. 1959). Illegit. *nomen nudum*.

'Aurea' (Beardslee Nurs. Cat., Perry, Ohio. 1958). "Golden leaved Forsythia with pale yellow flowers, found by us in a flowering shrub border."

'Compacta Nana' (Anonymous, Plant Buyer's Guide, Oak Park Nurseries, Inc., East Patchogue, L.I., N.Y. 1958). Illegit. *nomen nudum* = x *intermedia* 'Nana.'

'Dwarf' (Siebenthaler Nurs. Cat., Dayton, Ohio. 1951). Illegit. as a *nomen nudum* = x *intermedia* 'Nana.'

'Farrand' (Sax, *Arnoldia* 15: 10. 1955, Sax ex Wyman, *Arnoldia* 16: 14. 1956). Changed at the request of Mrs. Beatrix Farrand to 'Beatrix Farrand' in 1959; = 'Beatrix Farrand.'

'Lynwood Gold' (Wayside Garden Cat., Mentor, Ohio. 1949). A commercial synonym = 'Lynwood.'

'Mertensiana' (Mertens & Nussbaumer ex Krussm. in *Deutsche Baumschule* 2: 298. 1950). Originated in nursery of Mertens and Nussbaumer, Zurich, Switzerland, in 1949. "Low, compact, leaves monstrous, variable. Distinguished by deformed leaves and crowded flowers."

'Nana' (Wyman, *Nat. Hort. Mag.* 40: 194. 1961). Low dwarf, with simple, lobed and sometimes compound leaves; lamellate pith between the nodes, solid pith at the nodes; slow to bloom; poor, greenish-yellow flowers. A twenty-year-old plant was only 5' tall and 8' wide. Originated in midwestern United States.

Forsythia suspensa (Thun. Vahl, *Enum. Pl.* 1: 39. 1804).

'Aurea' (Anonymous, Pl. Buyer's Guide. 1958). Illegit. *nomen nudum* = 'Variegata.'

'Aureo-variegata' (Koehne in *Gartenflora* 55. 206. 1906) = 'Variegata.'

'Decipiens' (Koehne, *Gartenflora* 55: 206. 1906). Originated in Späth Nurseries, Germany, 1905; flowers single, not nearly as conspicuous as those of other cultivars of this species.

'Fortunei Nana' (Siebenthaler Nurs., Dayton, Ohio, Cat. 1938). Illegit. *nomen nudum* = *F. intermedia* 'Nana.'

'Nyman's Variety' (Krussman, *Die Laubgehölze* 155. 1951). Branches bronze-colored, closely resembles *F. suspensa*.

sa atrocaulis, bush erect, profuse flowers of ivory yellow.

'Pallida' (Koehne, *Gartenflora* 55: 206. 1906). Flowers a very pale, washed-out yellow.

'Variegata' (Butz; Penn. State Agr. Coll. Rep. 1899-1900: 376. 1901). "With yellow variegated leaves."

Forsythia viridissima (Lindl., *Jour. Hort. Soc.*, London 1: 226. 1846).

'Variegata' (*Dict. of Gard.*; *Roy. Hort. Soc.* 2: 830. 1951). A "golden variegated form."

Other hybrids (?)

'Golden Queen' (Anonymous, *Pl. Buyer's Guide*, 1958). Illegit. *nomen nudum*.

'Gloriosa' (Brimfield Gardens *Nurs. Cat.*, Wethersfield, Conn. 1956). Listed as "pale yellow flowers." Illegit. *nomen nudum*.

'Golden Bell' (Anonymous, *Pl. Buyer's Guide*, 1958). Illegit. *nomen nudum*. Undoubtedly confused with the sometimes used general common name of Forsythia.

'Golden Sun' (L. Kammerer, *Morton Arb.*, *Bull. Pop. Inf.* 34: 25. 1959). Illegit. *nomen nudum*.

3. Forsythias introduced by the Arnold Arboretum

The Arnold Arboretum has played a long and continuous role in the story of the cultivated Forsythias, perhaps more than any other institution. This role has included the discovery and introduction into cultivation of new species from the wild, the introduction of cultivars developed abroad, and the breeding and introduction of improved new forms.

Species or varieties discovered and introduced by the Arnold Arboretum

F. ovata, introduced by E. H. Wilson. Collected in Diamond Mountains, Korea, 1917.

F. suspensa var. *atrocaulis*, discovered by E. H. Wilson. Collected in Hsing-shang, Hsien, W. Hupeh, China, January 13, 1908.

F. viridissima var. *koreana*. Seeds sent by the Korean Department of Forestry, 1919.

F. x intermedia 'Spectabilis.' Plants received from Späth Nurseries, Berlin, Germany, 1906.

F. x intermedia 'Tremonia.' Cuttings received from Dortmund Botanical Garden, Dortmund, Germany, 1966.

Hybrids produced at the Arnold Arboretum

'Arnold Dwarf' (*x intermedia x japonica* var. *saxatilis*) — 1941.

'Arnold Giant' (*x intermedia* 'Spectabilis') — 1947.

'Beatrix Farrand' (*x intermedia* 'Arnold Giant' *x intermedia* 'Spectabilis') — 1959.

'Karl Sax' (*x intermedia* 'Arnold Giant' *x intermedia* 'Spectabilis') — 1960.

'Primulina' (*x intermedia* 'Spectabilis') — 1912.

Cold Damage to Forsythia Flower Buds

At the Arnold Arboretum in spring of 1967 the Forsythia plants near the summit of Bussey Hill flowered well while most of those in the main group opposite the shrub collection were ringed with blossoms only on their lower portions. Why the Forsythias behaved differently in the two locations may be readily explained by figures contained in temperature records kept at the Dana Greenhouses.

Since August 15, 1962, the Arnold Arboretum has operated a simple weather station in collaboration with the U.S. Weather Bureau. (See *Arnoldia* 30(5): 186-193, Sept. 1970). The equipment consists of a maximum and minimum thermometer and a non-recording precipitation gauge. Daily at 8 A.M. observations of temperature and precipitation are recorded and some interesting data have been accumulated.

Those familiar with the Arnold Arboretum are aware of the wide variety of topographical characteristics that are present within the bounds of this relatively small 265 acre area. With such geographical variation there is also a wide range of climatic differences. These deviations from the overall climatic picture have been termed microclimates. Microclimatic situations are infinite. They can occur at hilltops, slopes, valleys, different sides of a house, either side of a wall, under a tree, over a stone, or in a footprint. Areas concerned can be highly localized and sometimes involve distances as little as portions of an inch.

Temperature at Ground Level

In early autumn of 1966 a recording thermometer was placed on the ground below the Arboretum's official thermometer which is positioned at 5 feet. Each day when official observations were made, the temperature at the ground was also recorded. During some nights with radiational cooling, temperature differences as great as 16° existed between the two levels.

Radiational Cooling

Radiational cooling is typical of calm, clear nights during

which the atmosphere loses heat to outer space through radiation. In the absence of wind, cold air settles to the ground and drains from the higher elevations to lower areas. These nights during which our lowest temperatures occur are the most damaging to plants. Temperature drop is often greater during winter than at other seasons because the longer nights allow radiation to take place over a longer period of time.

Table 1 shows differences in minimum temperatures which occurred at ground level and the official thermometer five feet above ground level in February and March, 1967.

Table 1 reveals two instances in which the flower bud damage described above could have occurred. The buds of most Forsythias are susceptible to freezing at about -15° . February 13 shows -9°F at official level and -22°F at the ground, while March 19th shows 0°F and -16°F at these same levels. The wide differences in each example would indicate nights of radiational cooling and therefore even deeper cold in the Arboretum's low areas. The Forsythia collection is at a lower elevation than the weather station, and it is situated on the fringe of the large bowl-shaped cold pocket that contains the shrub collection. It is reasonable to suppose that the temperature there was many degrees colder than those cited in each of the above examples. Buds which led to the display of flowers on lower portions of the plants as previously described were insulated by a protective covering of snow, and were not affected. Snow with its myriad air spaces is the finest of all winter protective coverings. The Forsythias on Bussey Hill are located on slopes with good air drainage and they flowered well in 1967. Owing to more favorable microclimates their buds were not damaged.

Graduation of Cold

In January, 1968, additional thermometers were placed at our weather station so that temperatures at the ground and at one and two foot levels could be recorded. Table 2 shows some temperatures at these levels during the mid-January cold spell, 1971.

Forsythia bloom at the Arnold Arboretum — Spring 1971

It may be predicted as of January 22, 1971, that Forsythia flowering in spring of 1971 at the Arnold Arboretum will follow the pattern previously described for 1967. In the main collection flower buds above the present 15-inch snow line would have been killed in the mid-January cold spell, perhaps on the 17th or 19th of January. On those dates the ground level tempera-

tures fell to -16° and -19° at the Arboretum weather station. If no deep cold occurs during diminished snow for the balance of the winter, a ring of blossoms from ground level to 15 inches will be present. Forsythias near the summit of Bussey Hill are located in more favorable microclimates and should flower well. It is quite likely that Forsythias in the Boston suburbs will also conform to this prediction.

ALFRED J. FORDHAM

TABLE 1

Differences in minimum temperatures at ground level and five feet, in February and March, 1967

Feb.	Five feet	Ground	Mar.	Five feet	Ground
1	13	14	1	17	13
2	32	32	2	9	4
3	17	18	3	14	14
4	9	3	4	32	32
5	21	20	5	28	26
6	22	20	6	31	30
7	10	8	7	31	30
8	-4	-3	8	19	10
9	9	-6	9	22	13
10	16	19	10	28	15
11	27	17	11	36	28
12	9	6	12	35	28
13	-9	-22	13	22	16
14	0	-1	14	36	32
15	14	32	15	33	30
16	38	32	16	24	23
17	17	16	17	12	6
18	14	12	18	5	-2
19	6	-1	19	0	-16
20	11	12	20	14	1
21	27	25	21	22	12
22	14	5	22	28	26
23	22	16	23	25	24
24	13	7	24	26	17
25	9	2	25	30	24
26	7	3	26	32	26
27	6	-3	27	33	24
28	23	12	28	34	32
			29	36	34
			30	24	26
			31	30	24

TABLE 2

Some temperatures at varying levels in January, 1971

Jan.	Ground	1 Foot	2 Feet	5 Feet
17	5*	-16	-11	-7
18	-3*	-8	-5	-2
19	-19**	-15	-12	-9
20	-12**	-9	-6	-5

* Thermometer in path dug in snow at base of thermometer stand.

** Thermometer removed from path and placed on snow near base of the stand (snow was 15 inches deep).

Key to Forsythias

(Modified from Rehder's Manual of Cultivated Trees and Shrubs)

(Note — in the flowers of Forsythia the style may be either longer or shorter than the stamens).

- A. Branches hollow in the internodes, without pith of any kind; with solid masses of pith only at the nodes; leaves often 3-foliate or 3-parted on the shoots; flowers 1-3(-6) in each cluster (2-6(-12) at each node) corolla about 2.5 cm. long; calyx about as long as the corolla tube. Branches arching. Flowering April-May. *F. suspensa*
- AA. Branches with thin, papery lamellae of pith in the internodes, sometimes with solid masses of pith at the nodes. B
 - B. Petioles and lower surface of the veins (and leaves) pubescent C
 - C. Branches arching, calyx as long as the corolla-tube, flowers 1-3 in each cluster, the corolla about 2.5 cm. long *F. suspensa* f. *pubescens*
 - CC. Branches erect or spreading, calyx shorter than the corolla-tube D
 - D. Flowers solitary (paired at the nodes), corolla about 1.5 cm. long. Flowering in April *F. japonica*
 - DD. Flowers 1-3 in each cluster (2-6 at each node) corolla 1.5-2.0 cm. long. Flowering in April *F. giraldiana*
- BB. Whole plant glabrous, flowers solitary or several in each cluster (2 — several at each node), corolla 2 cm. or more long E
 - E. Pith in solid masses at the nodes, usually with lamellae of pith in the internodes; leaves often 3-parted on the shoots; flowers usually several in each cluster, corolla about 2.5-3.0 cm. or more long, calyx shorter than the corolla tube. Branches arching. Flowering in April and May *F. x intermedia*
(*F. suspensa* x *F. viridissima*)

EE. Pith lamellate throughout nodes and internodes, leaves generally entire, only exceptionally 3-parted F

F. Leaves usually entire or with only a few shallow teeth, ovate to ovate-lanceolate; flowers usually solitary (paired at each node), corolla about 2 cm. long, calyx shorter than the corolla-tube, branches erect.

* main axis of flowering branches 3-5 mm. in diameter. Flowering in April and May

F. europea

** main axis of the flowering branches 2-3 mm. in diameter. Flowering in April

F. giraldiana

FF. Leaves serrate, only occasionally nearly entire .. G

G. Leaves elliptic-oblong to lanceolate, cuneate at the base, serrate only above the middle; branches angular, green; flowers 1-3 in a cluster (2-6 at a node), bright yellow with a greenish tinge, corolla 2.0-2.5 cm. long, calyx about half as long as the corolla tube. Branches erect. Flowering in April-May

F. viridissima

GG. Leaves ovate, usually rounded at the base and serrate nearly to the base; branches round or nearly so, yellowish; flowers solitary (paired at the nodes), amber yellow, corolla 1.5-2.0 cm. long; calyx about half as long as the corolla-tube. Branches erect. Flowering in March and April

F. ovata

Christmas Bird Count at the Arnold Arboretum

On January 2, 1971, a group of amateur ornithologists led by Miss Miriam Dickey met at the Arnold Arboretum to participate in the National Audubon Society's annual "Christmas Count" of birds.

The group covered the Arnold Arboretum with the following results:

Blue Jay	44	Junco	18
Brown Creeper	2	Mockingbird	1
Cardinal	4	Nuthatch	8
Cedar Waxwing	20	Purple Finch	1
Chickadee	18	Robin	38
Common Crow	26	Song Sparrow	2
Goldfinch	3	Starling	29
Gull, Great Black-backed	8	Towhee	1
Hawk, Red-Tailed	1	White-throated Sparrow ..	5
House Sparrow	17	Woodpecker, Downy	9
		Woodpecker, Hairy	2



Notes from the Arnold Arboretum

Perennials for

Low Maintenance Gardening

Part II

Dictamnus — Gas Plant, Dittany, Burning-Bush

Of all the plants discussed in this article, *Dictamnus albus* (listed as *D. fraxinella* in most catalogs) is, along with Peonies, without doubt the most permanent of all perennials in the garden. The best treatment is simply to leave the plants alone, and they will increase in vigor as each year passes. In fact, the best way to ruin a good clump of *Dictamnus* is to divide it and attempt to reestablish the resulting plants elsewhere. For this reason, it is advisable to begin with young plants of seedling size, preferably started in pots. Even then it may take several seasons before they give the desired effect, but the results will be worth waiting for.

Although it will tolerate partial shade, a sunny location with moderately rich soil is probably best for the Gas Plant. Situations which remain wet for any length of time should be avoided, and the plant can be counted upon to withstand moderate periods of drought. Although it is slow to start, a well-grown specimen will take up a lot of room in the border and it is best to leave about two feet in each direction for expansion. Annuals can be used to fill the gaps in the meantime. A well-grown Gas Plant will eventually attain a height of three feet, and is of value as a specimen plant in the background of the small garden or as a middle-of-the-border subject when combined with shrubs. Staking is not required as the stems do not have the tendency of other plants of similar height to fall over.

The short period of blossom (about one week during July) has been listed as an objectionable characteristic. Perhaps this would be true if it were not for the handsome pinnate leaves which remain in good condition throughout the season and provide an excellent accent wherever the plant is placed.

The name Gas Plant or Burning Bush is derived from the fact that under exactly the right conditions the plant exudes a volatile

gas, particularly around the flowers, and this can be ignited by a match. The author has yet to encounter "exactly the right conditions" under which this can be done. Supposedly they exist during calm sultry evenings while the plant is in bloom.

Dictamnus albus has white flowers and those of its variety *D. albus* var. *ruber* are a soft rose-pink.

Digitalis — Foxglove

The Common Foxglove, *Digitalis purpurea*, is an old time favorite, but it is excluded here because of its biennial character. Plants must be renewed each year from seeds and winter protection is necessary in areas of severe cold. It is true that Foxgloves will, under the right conditions, self-sow in the same manner as Hollyhocks. In a semi-wild garden, this may be a distinct advantage, but in most borders considerable time must be spent pulling out the hundreds of seedlings which come up in the most unwanted places.

There are a few perennial species of *Digitalis*, but they are not particularly showy in the border, and suffer from the same over-promiscuity in their seed sowing activities.

Echinops — Globe Thistle

If the reader is unfamiliar with the appearance of Globe Thistles, he should make an attempt to observe them growing in another garden before deciding to plant them in his own. Opinion seems to be divided pretty nearly 50-50 for or against this group.

Some people object strongly to the coarse general appearance of the plant, and the harshness of the thistle-like leaves. Others, including those who like to arrange cut flowers, prize the blue globular flower heads which are made up of many spiny bracts and flowers. The thistle-like leaves are white on the under-surfaces and give character to the plant.

Aside from this, the author has a distinctly unpleasant recollection of once having to dig and divide a large clump of *Echinops*. The vigorous fleshy root system penetrates the soil to more than a foot in depth, making this a particularly arduous chore, so it is best to leave *Echinops* alone as long as the plants maintain their vigor. The task will probably have to be faced, however, every four or five years.

There are a number of species and varieties to choose from, but without question the best is the cultivar of *E. exaltatus* called "Taplow Blue." This selection comes from England and has

glistening rich blue flower heads up to three inches in diameter.

To be seen at their best, all varieties of the Globe Thistle should be planted in full sun and in a soil which is somewhat on the lean side. Shade or rich soil conditions encourage them to grow tall and lanky. In general, however, they are quite easy to grow.

Epimedium — Barrenwort, Bishop's Hat

This group is well known to a number of advanced gardeners, but has been undeservedly neglected by the majority of the gardening public in this country. Although they will grow well in full sun if the soil is moist, they are best used as ground covers in shady areas where the soil is fairly rich and damp. This would exclude *Epimedium* from many perennial borders and they are mentioned here mainly because they will grow well at the base of a tree if fertilizer is applied occasionally.

The problem of what to plant at the base of the tree is always encountered, and a number of very charming herbaceous borders have been planned around existing small trees such as Crab apples or Magnolias.

The pinnate foliage (some varieties have very interesting leaf patterns) is attractive when the plants are not in flower and is made more valuable by its ability to persist into the winter. The foliage should be cut back to the ground in late winter or very early spring to enhance the beauty of the new leaves in spring. New leaves are pale green, tinted with a delicate shade of rose, but in the summer become deeper and often are mottled with purple. The cooler weather of autumn brings out an attractive crimson coloration.

Many varieties can be obtained if one is patient enough to sift through a number of catalogs. Unfortunately, where this group is concerned, incorrect names abound in the trade.

E. grandiflorum produces the largest flowers of any in the genus. They vary between one and two inches, the outer sepals are red, the inner violet, and the spurred petals are white. *E. grandiflorum* var. *violaceum* has pure violet petals.

E. pinnatum has small bright yellow flowers with rose-red spurs. Most plants listed in catalogs under this name are probably *E. pinnatum* var. *colchicum* which grows a foot tall and blooms later than *E. grandiflorum*.

One of the showiest is *E. x rubrum* (*E. alpinum* x *E. grandiflorum*) which has large, brilliant red flowers flushed with yellow or white. The juvenile foliage is red, a most attractive asset.

The author's favorite is *E. x youngianum* var. *niveum*, a hy-

brid between *E. grandiflorum* and *E. pinnatum* var. *colchicum*. Plants are a bit shorter than those listed above, usually only reaching a height of ten inches. The bronze foliage provides a handsome contrast to the pure white flowers.

Eupatorium — Mist-Flower, Hardy Ageratum

Only one species in this genus is suited to the perennial border, all others being more suitable when naturalized in wild gardens or woodlands. *E. coelestinum* is native from New Jersey to Florida and Texas, and its pale lavender flowers can be used in the same manner as the more fickle Asters to provide a contrast to the rich yellow, orange, and bronze of many autumn flowering plants. It resembles Ageratum when in bloom and some people will mistake it for that plant even though it does not have the compact habit of Ageratum.

This has been listed in several books as having invasive tendencies, but although it will spread fairly rapidly, the author has not seen a situation where it was out of hand. Best results are obtained when plants are exposed to full sunlight, and perhaps its most serious drawback is that even in sun the two-foot plants may become straggly after a few years and need to be divided.

E. coelestinum 'Wayside Variety' was grown at the Arnold Arboretum last year and seems to be somewhat more compact in habit. It is a distinct improvement on the wild form.

Euphorbia — Spurge

Several members of this genus have given it a bad name among gardeners. *E. marginata* commonly called Snow-on-the-Mountain is an annual with decidedly weedy and invasive tendencies. *E. cyparissias* can be a great nuisance if planted in too rich a soil, becoming rampant and soon outgrowing its welcome. This is, however, a good rock garden subject and can be used as a ground cover in very arid places. *E. myrsinites* is another species which may be difficult to keep in bounds.

However, *E. epithymoides* (sometimes seen in catalogs as *E. polychroma*) is a neat, symmetrical plant for the front of the border. It grows to a height of one-and-a-half to two feet and produces globular umbels of bright chartreuse-yellow bracts from the end of April until early June. As with the rest of this family, flowers are really not the conspicuous feature, and color is produced by the enlarged bracts which surround the true flowers. The foliage remains attractive all summer and turns to a rather handsome dark red in autumn.

E. wulfenii is of value for its handsome clusters of yellow bracts in May. It is taller than *E. epithymoides* and reaches a height of three feet. It is an unusual cut flower, and even more so for its blue-green leaves.

All species of *Euphorbia* do best in well-drained sandy soils and should be considered by anyone who has dry soil conditions. The last two species above are the best and they can be expected to last for many years with very little attention. In fact, all *Euphorbias* resent being disturbed when well established and it is better to start with young plants than with divisions.

Filipendula — Meadow-sweet, Dropwort

This genus used to be included with *Spiraea*, and unfortunately, like *Astilbe*, it can still be found by this name in some catalogs. *Filipendulas* are usually grown for their large feathery panicles of numerous small flowers. Several of the species in common cultivation are quite tall and suitable for the rear of the border, used in combination with shrubs, or as woodland or streamside plantings.

F. hexapetala, the Dropwort, seldom exceeds two feet, however, and is an excellent border subject. The fern-like foliage is especially pleasing and can be used to advantage to tone down the leaves of certain coarser plants. The creamy-white flower panicles are produced in June. It is another plant for those who have poor dry soils, as it will succeed in such locations if fertilizer is given from time to time. Occasionally one can find the beautiful double-flowered form *E. hexapetala* 'Flore-Plena.' This is lower, to fifteen inches tall, and well worth the effort to locate in nurseries.

F. rubra, Queen-of-the-Prairie, is one of the best back-of-the-border plants. It grows from four to six feet tall and produces large terminal clusters of small pink flowers in June and July. Its variety *F. rubra* var. *venusta* (Martha Washington Plume in some catalogs) is a much better form with deep pink flowers.

F. ulmaria, Queen-of-the-Meadow, is another tall species which will reach four to five feet in height under good conditions. This is a Eurasian species which is now rather widely naturalized in New England.

Filipendulas are of added value because they can go for many years without needing to be divided. A possible drawback to the last two species discussed above is that watering is essential during dry periods and these are best planted in moist, fertile soil.

Gaillardia — Blanket-Flower

Gaillardias can cause great disappointment unless they are grown in a very well-drained soil. Even then, permanence is somewhat questionable. Many types sprawl unless staked early, and the best ones are seldom very hardy. Some people are greatly attracted to the bright color of the flowers, others think them too gaudy. Some varieties are advertised to bloom on and on during the summer, and this is true if one is careful to remove dead and fading flower heads faithfully.

One member of the Arboretum staff has suggested that these might best be used for colonizing gravel heaps, and although this suggestion might have some merit, it must be said that *Gaillardias* are best left to those with the time and patience to cater to their specialized needs. For those in this latter category, some of the good varieties to watch for in catalogs are as follows: *G.* 'Burgundy' — deep red, two feet; *G.* 'Goblin' — red and yellow, one foot; *G.* 'Sun Dance' — red with yellow edges; and *G.* 'Sun Gold' — yellow, two feet.

Geranium — Cranesbill

These are sometimes confused with *Pelargonium* (whose common name, unfortunately, is *Geranium*), a showy group of great value as pot plants and for summer bedding. True *Geraniums* come from temperate parts of the world. Some (but not all) of the handsome species are hardy as far north as Boston and among them are several which will adapt well to low-maintenance plantings.

The most commonly planted is *G. sanguineum*, a plant which forms a mound about a foot tall and two feet in diameter and produces rose-purple flowers in profusion from May until early August. The attractive leaves turn bright red in late autumn. *G. sanguineum* var. *album* has attractive white flowers and those of the selection *G. sanguineum* 'Johnson's Blue' are a good bright blue. *G. sanguineum* var. *prostratum* (still in most catalogs as *G. lancastricense* or *G. sanguineum* var. *lancastricense*) forms a neat mat of foliage seldom over six inches high with freely borne light pink flowers with red veins.

It would be a mistake to plant any of the above in an overly rich soil as they may spread too rapidly and have to be divided after a few years. Although they will withstand light shade, flowering will be more profuse in full sun. Under this latter condition, plants should be able to remain undisturbed for a number of years. Sometimes grasses can invade an old clump to such an extent that it will have to be lifted and divided.

Another nearly indestructible hardy species is *G. grandiflorum*. This species is usually only a foot high and produces large purple-blue flowers with red veins in clusters on fifteen-inch stems from May to July. *G. grandiflorum* var. *alpinum* is a smaller plant with larger, nearly true-blue flowers. As with *G. sanguineum* an overly rich soil encourages excessive spreading tendencies.

Geum — Avens

Geums have had a bad name among gardeners in the Boston area for some time. Many people have heard glowing reports of the wonderful flower colors but have been dismayed when their newly acquired plants have died during the first winter. A number of beautiful cultivars such as 'Mrs. Bradshaw' and 'Lady Stratheden' are derived from *G. chiloense* which is reliably hardy only as far north as Long Island. These are the ones which have caused the trouble and they should be avoided in our area.

G. coccineum, a species with bright orange-red flowers, is native to Asia Minor and Southern Europe. Breeders have selected hardy forms of this and crossed them with the less hardy *G. chiloense* to produce a remarkably showy and valuable group of cultivars which are quite hardy in our area and which do not require the biennial divisions necessary to maintain the old selections of *G. chiloense*.

Several of the outstanding newer hybrids to watch out for and try are as follows: *G. 'Dolly North'* — flowers gold overlaid with orange; *G. 'Fire Opal'* — flowers rich red with bronzy overtones; *G. 'Princess Juliana'* — flowers clear rich orange; *G. 'Red Wings'* — flowers scarlet; *G. 'Wilton Ruby'* — flowers ruby-red.

These hybrids grow to two-and-a-half feet tall and bloom from May to July. Young plants are slow to start and it may take a year or two for them to become established. Those who have been disappointed with the old cultivars of *G. chiloense* should be aware of this latter characteristic before making hasty conclusions about the newer ones.

Gypsophila — Baby's-breath, Chalk-plant

The latter common name given above and the generic name derived from the Greek word which means lime-loving give one of the main clues to success with this group. It is wise to have the soil tested before growing most perennials, and this is particularly so with *Gypsophila*. If the reaction is lower than

pH 6, ground limestone should be applied to bring it up to pH 7 or pH 7.5. One other soil condition is equally as necessary if success is to be achieved. *Gypsophilas* will not overwinter in moist soggy soils and a well-drained sunny situation is essential. Further care should be taken in choosing a good location because all except the dwarf varieties of Baby's-breath take up a lot of room, and once established the thick fleshy roots resent any disturbance.

This may seem a rather long list of requirements for a plant that is included in a list of supposedly maintenance-free garden subjects. These requirements are, however, relatively simple if properly understood; and once established the plants can be expected to last for years if they receive the necessary dose of ground limestone from time to time. Many people who use relatively low-maintenance plants soon discover that mulching not only cuts down on the incidence of certain weeds, but improves the growth response of many plants. Baby's-breath will benefit from this in still another way, as a mulch will help prevent the thick fleshy roots from being heaved in the winter. The mulch, however, should not cover the crown of the plant or rotting may occur before the ground becomes completely frozen. In the coldest of winters in the Boston area, some plants of *Gypsophila* may be killed and a good mulching may prevent this.

The best and probably the easiest to obtain of the cultivars of *G. paniculata* is the double white *G. 'Bristol Fairy.'* This is an extremely vigorous plant which can eventually fill up an area in the border four feet wide, with stems three feet high. It has long been known that by proper placement of *Gypsophila* the large gaps left by the withering of early flowering plants such as Oriental poppies and *Dicentra spectabilis* can be filled. Other varieties of *G. paniculata* include *G. paniculata 'Perfecta,'* a recent introduction from Europe with flowers supposedly twice the size of *G. 'Bristol Fairy,'* and *G. paniculata 'Pink Fairy'* a form with fully-double pink flowers.

Helenium — Sneezewood

Cultivars of our native *H. autumnale* have long been considered essential for fall color in the border. The older forms grow from four to six feet tall and must be divided, if not every other year, then every third year, to maintain any semblance whatever of tidiness. Fortunately there are several newer cultivars which are shorter, do not fall over or need to be staked, and can be recommended here. *H. 'Bruno'* has dark red flowers on two-and-a-half-foot stems; *H. 'Moerheim Beauty'* has velvety

maroon-red flowers on two-and-a-half-foot stems; and *H. 'Pumilum Magnificum'* has yellow flowers on stems that are only twelve to eighteen inches high.

Chrysanthemums were described earlier in this article as too finicky to be included in a low maintenance scheme. The three cultivars named above can be used as a substitute to provide nearly the same effect at the same time with much less effort. They will grow almost anywhere, but do best in a moderately moist soil. Exposure to full sun will help to produce the desired bushy habit.

Hemerocallis — Daylily

Hybridizers have produced so many cultivars of this nearly perfect plant for the low maintenance garden that probably the greatest problem one will encounter is knowing which varieties to choose. In general the plants are nearly indestructible if placed in a reasonably fertile soil in sun or partial shade, but excessive fertility will lead to rank growth and poor flowering. Although it is often thought that Daylilies can be left to their own devices almost forever, division at infrequent intervals will produce superior plants. One of the biggest chores with Daylilies is the need to remove the unsightly flowering stalks after the flowers have gone by. This can be a task if one has extensive plantings.

Professional growers and amateur fanciers are now producing a completely new race of tetraploid hybrids which undoubtedly will be widely popular in the future. Although these can be obtained at present, prices still prohibit widespread use and they must be classed as "collectors items." Gardeners in the Boston area who wish to see these coming attractions of the Daylily world will want to visit the *Hemerocallis* plantings at the Case Estates of the Arnold Arboretum in Weston.

It would be extremely difficult to choose the best moderately priced varieties to grow today were it not for the 1970 Popularity Poll published in the December, 1970, issue of *The Hemerocallis Journal*. Daylily fanciers throughout the country have sent in lists of what they consider the best cultivars, and it is interesting to note that the six which are most popular in the Northeast also appear high up on the list of national favorites.

Those especially recommended are as follows: *H. 'Frances Fay'* — a low-growing variety with flowers of a melon tone (the melon in this case refers to cantaloupe); *H. 'Satin Glass'* — this is a new break in the "melon" color, being towards the pale creamy side; *H. 'Hortensia'* — the top winner in the national

poll with well-shaped golden yellow flowers, the petals are slightly twisted and ruffled; *H.* 'Luxury Lace' — has medium sized lavender flowers with a greenish throat; *H.* 'Cartwheels' — with medium-sized golden yellow flowers, which are almost round, a desired quality; *H.* 'Little Rainbow' — the unusually colored attractive flowers are pale yellow with blendings of pink, lavender, and green. It is somewhat surprising to note that no red-flowered varieties appear on this list. One of the best of these is *H.* 'Bess Ross' which has good clear red flowers without the brown-red or purple-red overtones present in some varieties.

None of the above varieties are tetraploids, and all are easily available at a moderate price.

Heuchera — Coral Bells, Alum Root

For best results in most locations *Heucheras* need to be divided every third year, a distinct disadvantage for a very charming group of plants. Although perfectly hardy, they are susceptible to heaving during alternate periods of freezing and thawing, and one should take the extra precaution of applying a mulch in winter. These traits are most unfortunate when considering a list of plants to be grown with a minimum of maintenance, and they cannot receive the high praise in this discussion that they would most certainly deserve elsewhere.

Modern hybrids come in a good range of flower colors and the beautifully mottled leaves can be decidedly attractive as well. Some of the good cultivars presently available are derived from *Heuchera sanguinea* or *H. sanguinea* x *H. micrantha* and include the following: *H.* 'Chartreuse' — chartreuse flowers; *H.* 'Fire Sprite' — rose to rose-red flowers; *H.* 'Freedom' — rose-pink flowers; *H.* 'June Bride' — a very good white flower; *H.* 'Pluie de Feu' — deep pink to almost cherry-red flowers; *H.* 'Rosamundi' — one of the best cultivars with coral-pink flowers; and *H.* 'White Cloud' — white to creamy-white flowers.

Hibiscus — Rose Mallow, Hardy Hibiscus

The numerous cultivars which have arisen from the selection and crossing of *Hibiscus moscheutos* and *H. palustris* are not frequently seen in the Boston area even though most of them are perfectly hardy. This is strange because the equally showy tropical representatives of this genus are featured in many amateur greenhouses.

Some of the newer cultivars display gigantic flowers up to ten and twelve inches across making them the largest-flowered

herbaceous perennials that can be grown in this area. Some people object to the size and bright colors as being too gaudy but when grown as a single specimen in the mixed border, striking effects can be achieved. One great drawback is their susceptibility to attack by Japanese beetles. The large leaves become decidedly tattered if such attacks cannot be controlled.

Although they will grow well in an ordinary soil if watered during periods of drought, Hardy Hibiscus hybrids do especially well in moist situations and are the perfect answer where conditions are too moist for most other perennials. They attain a height of four to five feet in most situations but die back to the ground during the winter. One problem is that under good conditions, they seed themselves in a copious manner and all volunteers must be discarded if the good named varieties are to be retained. A number of the newer cultivars are presently being grown in the nurseries of the Arnold Arboretum, and it is hoped that in a few years we will have a good display of these valuable mid-summer flowering plants for visitors to see.

Some of the numerous varieties which are easy to obtain are: *H.* 'Appleblossom' — crinkly petals which are light-pink margined with a deeper rose-pink; *H.* 'Raspberry Rose' — flowers deep rose-pink with a bright red throat; *H.* 'Satan' — flowers a brilliant fire-engine red; *H.* 'Snow White' — a shorter plant (about three-and-a-half feet) with pure white flowers; *H.* 'Snow Queen' — the white flowers have wide, overlapping, crinkled petals and a deep red throat; *H.* 'Super Clown' — flowers white and pink; *H.* 'Super Red' — the medium-sized flowers dark red; *H.* 'Super Rose' — brilliant rose flowers up to ten inches in diameter; *H.* 'White Beauty' — pure white flowers ten inches in diameter with a red throat. Many other cultivars are on the market and there will undoubtedly be an upswing in interest in this group before long.

Hosta — Plaintain-lily

If given a proper location as regards both soil and light, this can be another large group to delight the gardener who cannot spend a lot of time pampering his plants. A moderately rich soil with partial shade (preferably the shade of high trees) is about all that *Hostas* require to develop into majestic, eye-catching specimens. A visit to the *Hosta* collection in the woods at the Case Estates can be a rewarding experience as most visitors are unaware of the exciting range of variations in this group. This special planting is one of the most extensive collections of *Hosta* in this part of the country.

As with the Daylily, the most demanding seasonal task with Hostas is the removal of the scapes once the flowers have gone by. They not only are unattractive but should not be allowed to go to seed, as certain named varieties do not reproduce true to type and the resulting seedlings can be a distinct nuisance. Nonetheless some of the good cultivars on the market today have arisen as chance seedlings in just this way. For an interesting article on this subject and the development of a number of cultivars see *Francis Williams and Her Garden Adventures* by Gertrude C. Wister, *Arnoldia*, Vol. 30, No. 4, pp. 148-154. 1960.

There is little doubt that most Hosta cultivars are seen to best advantage if planted singly as specimen plants rather than being massed. This way the handsome radial symmetry of the individual plants can be seen to best advantage. Some of the more vigorous varieties will eventually occupy up to four feet of space in the garden and this must be taken into account at planting time. Some types make excellent ground covers, and when planted for this purpose the symmetrical effect is sacrificed. *H. undulata* with its white and green wavy leaves has been used extensively for this purpose and is often seen growing in the full sun — a condition not tolerated well by most other varieties.

The taxonomy of Hosta is confused and synonyms and incorrect names abound. The following is a list of some of the best varieties as they appear in the majority of nursery catalogs. It should be noted here that they fall into two different groups, some grown for the interesting leaves only, and others for their flowers. Plants in this list have been selected to provide a period of blossom from late June to September. *H. 'Betsy King'* which was hybridized by Frances Williams is grown mainly for its rich purple flowers which appear on twenty-inch scapes in August. *H. fortunei* (often listed as *H. glauca*) has glaucous, pale green leaves with lavender-blue flowers on spikes two to three feet high in August. A number of worthwhile variations exist and are grown as much for the flowers as for the leaves. *H. 'Honeybells'* has very fragrant white flowers with violet veining which appear on forty-inch scapes in late August. The leaves are light green. *H. 'Royal Standard'* has very sweetly scented white flowers on two-foot scapes in August and September. It is grown more for the sweet smelling flowers than for the foliage. *H. sieboldiana* and its varieties and forms are grown for the remarkable large heavy-textured leaves. It is one of the very best of all the plants for semi-shaded to heavily-shaded conditions. One of the most sought after of all varieties is *H. siebol-*

diana 'Frances Williams' sometimes called *H. sieboldiana* 'Yellow Edge' or *H. sieboldiana aureo-marginata*. This form has lovely round glaucous leaves which are bordered in yellow.

H. undulata has white and green wavy leaves and has been much used in foundation plantings and as a ground cover. It blooms in July and forms a plant ten to twelve inches high. *H. ventricosa* (*H. coerulea*) is especially valuable for its beautiful dark violet flowers on spikes three-and-a-half feet high, and for its deep green leaves. It blooms in late June and early July.

To be continued

ROBERT S. HEBB

Summary of weather data recorded at the Dana Greenhouses,
January 1971.

	Precipitation	Average Daily Temp.
January	10.3	33.1

Salix lucida with *Skunk Cabbage*.

Photo: P. Bruns.



Arnoldia Reviews

Trees and Shrubs Hardy in the British Isles, by W. J. Bean.

The present generation of gardeners has grown up with two monumental reference works devoted to trees and shrubs: Rehder's "Manual of Cultivated Trees and Shrubs," a one volume handbook for identification, and Bean's "Trees and Shrubs Hardy in the British Isles," a two (or three in later editions) volume compendium of descriptive matter. They are both monuments to the incredible energies of their respective authors. Both works were produced as a response to the large number of new woody plants that were introduced into cultivation from eastern Asia in the last part of the nineteenth and early part of the twentieth centuries.

Rehder's "Manual . . ." was originally published in 1927 and issued in a revised edition by its author in 1940. Bean's "Trees and Shrubs . . ." was originally published in 1914 in two volumes, went through six editions in the author's lifetime, and was last issued three years after his death, in 1949, as a seventh edition in three volumes, edited from the author's manuscript. Economic exigencies required that the successive editions of Bean be issued with a minimum of alteration to the text of the original volumes, but with the new matter added as a supplementary volume.

Bean's "Trees and Shrubs . . ." was always a discursive and descriptive work. It described the forms cultivated in the British Isles, but made no real attempt to indicate diagnostic characters or to provide keys for identification. As such, Bean and Rehder were complimentary texts, for Rehder's "Manual . . .", despite its cryptic notes on flowering time and hardiness, is essentially a manual for identification.

For years there have been rumors that there was to be a new edition of Bean, and at last the first volume of the new edition is here. While in appearance it resembles the old Bean, there is much that is new. The entire text has been reset in a more modern type face. All of the descriptive material has been cast into one alphabet, and nomenclature and synonymy have been

brought up to date. Many of the species were known to Bean only as juvenile specimens — the new text brings his observations up to date by the incorporation of data on mature specimens. As much as possible of Bean's original text has been saved; the editing has consisted to a large extent of adding new observations.

The new seventh edition of Bean's "Trees and Shrubs Hardy in the British Isles" seems destined to take its place on the bookshelves of all who have a serious interest in growing trees and shrubs in the temperate zones. The editors are to be congratulated on producing a thoroughly up-to-date work that retains the flavour of the original; and the publisher is to be applauded for a fine job of book production. The reasonable price of about twenty dollars per volume is due to financial assistance from the Royal Horticultural Society and the Nuffield Foundation. We, the public, must be forever grateful to all concerned.

G. P. DEW.

W. J. Bean, *Trees and Shrubs Hardy in the British Isles*, London: John Murray (Publishers) Ltd., 1970. £8 net.

Hortulus, by Walahfrid Strabo, translated by Raef Payne

The book's white vellum binding and the gold letters *Walahfrid Strabo. Hortulus. 1510/1966* stood out among the dark volumes on the shelf.

I took it down and opened it to one of the middle pages:

Then my small patch was warmed by winds from the south
And the sun's heat. That it should not be washed away,
We faced it with planks and raised it in oblong beds
A little above the level ground. With a rake
I broke the soil up bit by bit, and then
Worked in from on top the leaven of rich manure.
Some plants we grow from seed, some from old stocks
We try to bring back to the youth they knew before.

I was in a dry dusty library but suddenly the warmth of the sun was on my face, I smelled the rich spring scent of manure, and felt damp crumbling soil between my fingers.

On the left-hand page the poem was in Latin, on the right in English. Each page was delicately imprinted with a pale green block print of a plant. I turned a few pages:

You have seen how ivy twines
 Its leaves round a lofty elm, from the earth's bosom
 Lapping its supple arms around the whole tree till it finds
 A way to the very top, and hides all the wrinkled bark
 With a mantle of green —

Who was Walahfrid Strabo? I turned to the front of the book. In the first twelve pages I found an account of this 9th century poet and monk by Wilfrid Blunt. The account of his life tells what is known historically about him, and includes footnotes of further historical information. Many of his writings were of religious subjects including a study of the growth of observances in the Church. His *Hortulus* seems to have been the only poem of nature that he wrote. Although the poem was written in the ninth century the manuscript lay undiscovered until 1509, when it was found and printed in Vienna in 1510. It has had an appeal to poets and gardeners ever since, and this volume includes a discussion of other manuscripts and editions of the poem which have appeared since medieval days.

After reading Walahfrid's life I turned again to the poem, and found, toward the front of the volume, twenty facsimile pages of the ninth century manuscript of the *Hortulus*, reproduced from La Biblioteca Apostolica Vaticana. Even though I have forgotten the little Latin I knew, these pages, written in neat Latin calligraphy, produced the same feeling of excitement and history that I get from turning the crackling pages of an old book.

I turned to the beginning of the English translation and began to read: "Here begins the Book on the Cultivation of Gardens by Strabus (or Strabo). May it find favor." I was in a monastery garden, sharing with a 9th century monk the joys and sorrows of watching a garden grow. I rejoiced with him at the arrival of spring:

A purer air was now beginning to herald
 Fine weather. Plants stirred in the zephyr's path
 Thrusting out from their roots the slender tips
 Which had long lain hidden in the earth's blind womb,
 Shunning the frost they hate. Spring smiled
 In the leaves of the woodland, the lush grass on the slopes
 And the bright sward of the cheerful meadows.

When a dry spell threatened I hurried with him to bring water:

Should a dry spell rob the plants of the moisture they need,
My gardening zeal and fear that the slender shoots
May die of thirst make me scurry to bring fresh water
In brimming buckets. With my own hands I pour it
Drop by drop, taking care not to shift the seeds
By too sudden or lavish a soaking.

Together in the library, surrounded by old books, Walahfrid and I strolled down his garden path. It was a kitchen garden, as most northern European gardens were in the ninth century. Tansy, Betony, Celery; he admired each and gave directions for its use.

At the end of his garden stood the rose and the lily, and with words of religious mysticism he compared them to the symbols of the Church:

These two flowers, so loved and widely honored,
Have throughout the ages stood as symbols
Of the Church's greatest treasures; for it plucks the rose
In token of blood shed by the Blessed Martyrs;
The lily it wears as a shining sign of its faith.

I closed the book and put it back on the shelf. That evening as I turned the hose on my newly planted beds I thought of the monk in his monastery garden. Eleven centuries separate us, but we share the hopes and despairs of gardening.

Some plants we grow from seed, some from old stocks
We try to bring back to the youth they knew before.

H. R. G.

This edition of *Hortulus*, published by the Hunt Botanical Library, Pittsburgh, Pennsylvania, is limited to 1500 copies. It can be ordered from Stechert-Hafner Service Agency, Inc., Box 2000, 260 Heights Road, Darien, Connecticut, 06820. The price is \$15.00.

Lecture Series: "Meet the Staff"

In the fall of 1968, the Arnold Arboretum instituted a series of talks by some members of the staff. This spring's program will allow five more members of the staff to speak about subjects that interest them and, we hope, you.

- Time: 8 P.M., Tuesday evenings: April 6 to May 18, 1971
- Place: The Schoolhouse, 133 Wellesley Street, Weston, Massachusetts
- April 6: *Plant Collecting in New Guinea*
Thomas G. Hartley, Ph.D., Associate Curator of Pacific Botany
- April 13: *A Botanist in Korea, Japan and Hong Kong*
Shui-Ying Hu, Ph.D., Botanist
- April 20: *Some Gardens in Southern Spain*
Helen Roca-Garcia, A.M., Research Assistant
- April 27: *A Naturalist in the Southeastern United States*
Richard Weaver, Ph.D., Assistant Curator
- May 4: *Pruning Practices at the Arnold Arboretum*
Robert G. Williams, B.S., Superintendent

Refreshments will be served at 7:30 P.M., and the lecture will begin promptly at 8. Please park in the areas indicated near the barn. Limited space makes it necessary to restrict the size of this group to 30 members.

This series requires a registration fee of \$5.00 for Friends of the Arnold Arboretum*; \$10.00 for others. Any member of the immediate family of a "Friend" may register for these meetings but a registration fee of \$5.00 must be paid for each person.

* Information on how to become a "Friend of the Arnold Arboretum" can be obtained by writing or calling the Arnold Arboretum, Arborway, Jamaica Plain, Massachusetts 02130. Telephone: 524-1717.

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ARNOLDIA

The Arnold Arboretum

Vol. 31, No. 3

May, 1971

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JUL 18 1971

NEW YORK
BOTANICAL GARDEN



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ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Mass. 02130

*Published six times a year: on the 15th of January,
March, May, July, September, and November*
Subscriptions: \$3.50 per year. Single copies, 60 cents
Application to mail at 2nd class postage rates
is pending at Boston, Mass.

On the cover: Lilacs in the Arboretum. Photo: P. Bruns.

The Fothergillas

The variety and abundance of native woody plants has long impressed visitors to the rich mountain forests and coastal swamps of the southeastern United States. From this rich and varied flora have come many of our cultivated flowering trees and shrubs. Perhaps the most famous of these, famous because of its history, rarity and beauty, is *Franklinia alatamaha*, discovered in southeastern Georgia by John and William Bartram in 1765. Other notable southeastern natives include the Sweet Shrub or Carolina Allspice (*Calycanthus floridus*), the Silverbell tree (*Halesia carolina*), and several of the Stewartias, Rhododendrons, and Magnolias. Less well known than these, but undeservedly so, are those plants of the genus *Fothergilla*.

These lovely shrubs are members of the same family as the Witch Hazel (Hamamelidaceae) and markedly resemble that plant in their foliage and the shape and structure of the fruits. The flowers, however, are quite different, at least with casual inspection. Rather than having the four narrow, yellow or reddish petals as in Witch Hazel, the flowers of *Fothergilla* are without petals, and even the sepals are greatly reduced. The conspicuous parts are the 12 to 32 stamens with creamy-white, narrowly club-shaped filaments and minute yellow or purplish anthers. The individual flowers are small, less than $\frac{1}{8}$ inch across, but they are massed in dense, showy spikes which may be as much as three inches long and one-and-a-half inches broad.

Although such colorful names as "Bottle-Brush Bush," "Granny Gray-Beard," "Spring-Scent," and "Witch Alder" (the last the one most commonly used in the technical manuals), have been applied to these shrubs, none are in general use. As is the case with the Rhododendrons and the Magnolias, the scientific name has become the popular name.

Dr. John Fothergill, in whose honor the genus was named, was a Quaker physician and philanthropist of London who maintained a life-long interest in natural history. At Upton, in Essex, he established an extensive garden in which he grew plants from all over the world in greenhouses reputed, at the time, to be the most extensive anywhere. It was as a patron however, that Dr.

Fothergill rendered his most important service to eighteenth century natural history. Among other important contributions, he subsidized William Bartram's travels in the southeastern United States; and Philip Miller's *The Gardener's Dictionary*, one of the earliest works devoted to gardening and horticulture, was begun and finished under his patronage.

At present, two species of *Fothergilla* are recognized, both of these native to the southeastern United States. *F. gardenii* (also known in the past as *F. alnifolia* or *F. carolina*) is restricted in its natural range to the Atlantic and Gulf Coastal Plains from northeastern North Carolina to the western panhandle of Florida and adjacent Alabama. Uncommon to rare in various parts of this range, *F. gardenii* is a plant of one of the characteristic Coastal Plain vegetation types — the pocosin or shrub bog. Pocosins are low-lying areas, moist but without permanent standing water, which support a characteristic vegetation composed primarily of broad-leaved evergreen shrubs including Sweet Bay (*Magnolia virginiana*), Red Bay (*Persea borbonia*), Wax Myrtle (*Myrica cerifera*) and several species of Holly (*Ilex*). The vegetation is dense and frequently covered with a dense mat of one of the Catbriers (*Smilax laurifolia*), a combination which discourages exploration. Fortunately for one interested in collecting it, as I was during my graduate days at Duke University, *F. gardenii* generally grows only around the edges of the pocosins. The peak of flowering in North Carolina, where it is most abundant, is during the second and third weeks of April, a time when few other shrubs are blooming. An exception, unfortunately for the collector, is one of the low Shad-bushes (*Amelanchier*) which is much more common and which strongly resembles *F. gardenii*, especially from a car window.

Fothergilla major (including a plant known in the past as *F. monticola*), in contrast to *F. gardenii*, is a plant of the southeastern highlands. It occurs in scattered localities from north-western North Carolina and northeastern Tennessee along the Appalachians into north-central Alabama, with a very few isolated populations in the Piedmont of central North Carolina. Growing at elevations several thousand feet higher than *F. gardenii*, the flowering season of *F. major* is consequently later, the peak in North Carolina occurring from late April to early May. Although *F. major* is infrequently encountered, it should not rightly be considered a rare plant since it is usually abundant in the localities where it occurs. The plants spread profusely by means of underground stems and often form large, virtually pure stands. *F. major* is occasionally found in mature,



Fothergilla major. Photo: H. Howard.



Fothergilla major in natural habitat near Hillsborough, N.C.
Photo: R. Weaver.

mesic forests, but its most characteristic habitats are disturbed areas or dry ridges, areas unfortunately also favored by one of the more unpleasant residents of the Southern Appalachians. One of my most vivid memories of those otherwise delightful summers in the southern mountains is of the day when I discovered that I had been sharing, who knows for how long, the largest patch of *Fothergilla* I have ever seen with a four-foot Timber Rattlesnake. Ever after I entered and explored *Fothergilla* patches with the greatest caution.

The two species of *Fothergilla* have often been confused by professionals and amateurs alike. There are, however, several characters by which they may easily be distinguished. *F. major*, or the Tall Fothergilla, is a profusely branched, medium-sized to tall shrub, usually three to six feet in height but occasionally becoming nearly twenty feet tall, at least in the wild state. The flowers appear with the leaves. The leaves are very similar to those of the common Witch Hazel (*Hamamelis virginiana*), both in size and shape; the major difference is that the leaves of Witch Hazel are toothed to the base while those of *F. major* are toothed only in the upper two-thirds. *F. gardenii*, or the Dwarf Fothergilla, on the other hand, is a low, sparsely branched shrub, very seldom more than 2½ feet tall. The flowers appear before the leaves. The leaves are much smaller and narrower than those of *F. major*, and they are toothed only above the middle, if at all.

There appear at present to be no named horticultural varieties of either of the species of *Fothergilla*. During the nineteenth century several varieties of *F. gardenii* were described from cultivated material in England. These were based on minor characteristics and do not merit recognition as cultivars. There are, however, two distinct types of *F. major*. The typical material has leaves which are distinctly whitish beneath; a form, which has been called *F. monticola*, has leaves which are green beneath. These types, which grow side by side in the wild, do not constitute biological species or even varieties but may well be worthy of recognition as cultivars. In addition to these rather distinct types, there is considerable clonal variation in shape, autumnal coloration, and profusion of flowering within the presently cultivated *F. major*. A selection program could well result in the establishment of several superior cultivars.

Although restricted in their natural ranges to the southeastern United States, the Fothergillas are hardy as far north as New England, at least one specimen of *F. major* prospering in the Arnold Arboretum for the last 95 years. *F. gardenii* is evidently

the more tender of the two species. The specimens of this species which have been grown at the Arnold Arboretum have not thrived, although one has survived for nearly 75 years.

The rarity of the *Fothergilla*s in cultivation is certainly not due to a lack of desirable characteristics. Although wild specimens bloom sparingly, the cultivated plants at the Arnold Arboretum are covered with spectacular masses of the unusual "bottle-brush" inflorescences in May. The flowers are decidedly fragrant, the scent being somewhat difficult to describe but nevertheless very pleasant. In the fall the shrubs are again a mass of color, the foliage varying from a brilliant scarlet to a more subdued russet. *F. major*, the more desirable of the species, becomes a dense, well-formed, erect or more or less spreading shrub; the largest specimen at the Arnold Arboretum is eight feet tall and about as broad. It is a particularly attractive subject for specimen planting and would also appear to be suitable in situations where a tall, informal hedge or barrier is desired. *F. gardenii*, a low, spreading shrub, is a fine subject for the shrub border, at least, in the Northeast, in sheltered spots.

The first recorded collection of a *Fothergilla* was by Dr. Alexander Garden, a Scottish physician who settled in Charleston, South Carolina in 1752. Dr. Garden was an avid student of natural history. He corresponded extensively with the great naturalists of his time, notably Linnaeus, and he was a good friend of John Bartram. *Fothergilla gardenii* was named in his honor as was the familiar *Gardenia*. In a letter to Linnaeus dated May 18, 1765, Garden sent the "characters" of what he considered to be seven new genera of plants. One of these was *Fothergilla (gardenii)*. At a later date, Garden sent specimens of these plants, both dried and pickled in "spirits of wine." In a series of letters from 1765 to 1773, Garden and Linnaeus carried on an argument concerning the classification of *Fothergilla*. Linnaeus maintained that it should be classified under *Hamamelis* (Witch Hazel) because of the similarity in the leaves; Garden persisted in pointing out the numerous differences between *Fothergilla*, which he called "Anamelis," and *Hamamelis*. Garden finally won the argument and in a letter to Linnaeus dated May 15, 1773, he wrote, "I am very glad that the most elegant shrub, called by me Anamelis, has at length obtained its proper place, for I was much afraid that it must have submitted to range under the banners of another." Garden was justifiably proud of his victory in the argument with the great Swedish naturalist. In a letter to his friend John Ellis, dated May 15, 1773, he wrote: "You would see by his [Linnaeus] last letter



Fothergilla gardenii Murr. From *Tableau encyclopédique et méthodique, Botanique*, by Lamarck and Poiret. 1799. Drawing by J. E. de Séve.

that I came off conqueror in our dispute about the new genus *Anamelis*, on which I plume myself not a little, but his candor charms me." Although he alluded to *Fothergilla* twice in descriptions of *Hamamelis virginiana*, the common Witch Hazel, Linnaeus never published a formal description of it. The founding of the genus, and the formal description of *F. gardenii*, is attributed to J. A. Murray (1774), a pupil of Linnaeus who revised a portion of his master's work.

Fothergilla gardenii was evidently already cultivated in England in 1765, the year of its discovery. It was grown at Kew Gardens as early as 1789, and seeds were offered for sale by several nurseries in England and France at the beginning of the nineteenth century. Although *F. major* was not formally described until 1820, drawings representing this plant, from material cultivated in England, appeared as early as 1780. A *Fothergilla*, probably *F. gardenii*, was grown in John Bartram's garden near Philadelphia under the name "Gardenia" around the year 1785, the first record of its cultivation in America. Herbarium records show that the *Fothergillas* are rarely cultivated in their native Southeast at present. Their cultivation in this country appears to be concentrated in the New England and Middle Atlantic States. Elsewhere, there are a few records from England, France, Germany, and Switzerland.

RICHARD E. WEAVER

Top: *Grandfather Mountain, North Carolina.*
Dry, rocky ridges, resembling the favorite habitat of
Fothergilla major. Photo: R. Weaver.
 Bottom: *Fothergilla major.* Photo: H. Howard.





Indian Relics of the Arnold Arboretum*

With more than three centuries of history intervening between the present and the long period when the Boston area was occupied by the Indians, it is interesting that evidences of these earlier inhabitants and examples of their work can still be found here. For at least half of this historic period it is probable that no Indians lived here under the primitive conditions of the stone age, nor were any of the implements made then that we find on the old hunting and camping grounds. During much of this time, and especially since the middle of the nineteenth century, Indian relics have been collected assiduously; and yet a diligent searcher even in such a frequented place as the Arnold Arboretum can still find abundant traces of former Indian occupancy in the indestructible stone implements made by them and used in the chase, in war, and in their domestic life.

Beginning with a chance find several years ago I became interested in looking for Indian evidences here, and by persistent search carried on at odd times in walks through the Arboretum I built up an interesting little collection, a part of which is shown on the accompanying plate.

Aside from the sentimental and romantic interest of these bits of prehistoric art, their chief value lies in the clues they give to the life and customs of the people who made them, and to the sites of habitations occupied long before the coming of the first colonists. This helps us to reconstruct some picture of the local conditions in those times and of the significance of the changes that have ensued.

The variety of artifacts remaining on the site of any prehistoric settlement at least in a climate like that of New England, is naturally limited and includes only objects made from indestructible materials, such as stone, or perhaps under more favorable circumstances, of shell, bone, or clay in the form of pottery.

* This article first appeared in December, 1934, in the Bulletin of Popular Information of the Arnold Arboretum.

It is also highly probable that in a thickly settled and much frequented locality such as the Arboretum, most of the larger and more conspicuous objects originally left on the site would have been carried away long ago by earlier collectors. But even with the very limited material that can still be found on these old camp sites it is possible to learn much about the habits and culture of the Indians who occupied them, and a number of deductions can be made about the physical conditions that induced them to select certain places for their camps or villages.

Most of the Indian artifacts that have been found in the Arboretum are of chipped stone, popularly called arrow heads, although probably only a few of the smaller ones were used for that purpose. Some of the larger and heavier ones may have been used for lance or spear heads and others for knives, scrapers or digging tools. A few of the rougher pieces that show evidence of chipping were probably unfinished or rejected objects. Besides the chipped implements, a few pieces have been found that were fashioned by pecking or grinding into hammer-stones, celts, scrapers, and other objects, some of them of doubtful use.

Stones accidentally shaped by natural agencies, such as small round boulders or sharp chips and flakes of the harder rocks, were no doubt used by the Indians with little or no improvement on their original condition, and in a few cases it is difficult to say whether a particular object should be regarded as an Indian relic or not. The experienced archaeologist can usually distinguish between even the roughest object of human handicraft and natural or unworked stones of similar shapes by the fine chipping or pecking found on the former and because of the obvious design shown in all the lines of fracture or polishing.

In selecting material for his work, the ancient craftsman, guided by experiment and experience, used only the best that was readily available for his purpose, but in emergencies inferior stones or other materials were sometimes employed. For the manufacture of chipped stone implements he had to use some hard fine-grained variety from which small flakes could be struck off without shattering the whole mass, and points with a keen cutting edge could only be fashioned from a stone that broke with a clear conchoid fracture.

Hard stones are abundant in the Boston area, although the material available here was not as good as that found in other parts of the country. All the relics found in the Arboretum, with one possible exception, are made from material which is local or found in eastern Massachusetts.

The material most commonly found in the Arboretum collection is porphyritic basalt or felsite. These two crystalline rocks without the porphyritic structure, as well as quartz, quartzite, chert, and argillite or slate, were also used for making projectile points and cutting instruments. Slate, mica-schist, sandstone, greenstone and granite furnished material for the pecked or abraded implements. Porphyritic rocks are those in which crystals, usually either of feldspar or quartz, large enough to be detected with the unaided eye, are imbedded in a groundwork or matrix of finer or microscopic crystalline structure. The felsites are of a light color, usually pink, flesh color or gray; basalt, or traprock as it is popularly known, is of a dark slate color or black on fresh fracture, often turning to a lighter color on weathered surfaces. Both of these classes of rocks are found in a number of places in the vicinity of Boston, occurring in dikes and ledges and as loose material derived from them, as well as in detached masses in glacial deposits. The harder and finer-grained varieties, either with or without porphyritic structure, furnished a very satisfactory material for the fabrication of chipped implements, as is shown by the fine workmanship, sharp points, and keen cutting edges of some of those found in the Arboretum. In other cases the material was not of such good quality, and as a result the fracture was hackly and the implements thicker and rougher. Quartz is another vein or dike material found abundantly in this region, both *in situ* and as rubble, and also as pebbles or boulders in the glacial drift. When broken it sometimes produces a very keen cutting edge and it was highly prized by the Indians for this quality. But it usually shatters too readily to have been used for any except the smaller implements. Quartzite, which is also common locally, was used sometimes for both chipped and abraded implements, but only the harder and finer-grained varieties could be chipped successfully, and most of the points made from this material are rather rough and crude. A few artifacts of chert have been found, although this material was not abundant nor generally of a good quality in this vicinity. Slate furnished a very indifferent material for chipping, but it was sometimes used, though perhaps only in emergencies. It was one of the most easily worked materials for grinding and it was used commonly in this way for a variety of purposes.

Of about sixty implements, either perfect or broken, in the collection made in the Arboretum, a little more than half were probably used as projectile points, either for arrows or spears. A number of the others, having a sharp edge but often a blunt

or rounded point, may have been used as knives. But in some cases it is impossible to distinguish definitely between those two classes of tools, since some of them could have been used for either purpose. One of the pieces shown in the illustration, No. 2, is a small hatchet or celt. Number 5 is a rather rough piece, plain on one side and bevelled on the other, that may have been used as a scraper in preparing buckskin and other hides. There is at least one other scraper in the collection. The largest chipped piece so far found, No. 14, measures in its present broken condition ten centimeters in length and five centimeters in greatest width. The color of the material was originally black, but it has been altered on the surface to an ashy gray by long weathering. Small chips struck off accidentally by the tools of the workmen who unearthed it show that the oxidation has penetrated to a depth of about one millimeter. The break is a very old one, as the truncated end is discolored as completely as the rest of the surface. This piece may have been used as a digger or as a skinning knife. Number 16, a drill or reamer, has undergone a similar alteration in color from the effects of weathering. Such drill points are comparatively rare, at least in a perfect condition, as they are fragile and easily broken. They are supposed to have been hafted and used for drilling holes by being turned with a swift rotary motion.

Among the arrow points shown in the photograph, Numbers 7, 10, 13, 26, and 27 were probably war points. Three of these are of the triangular unnotched type and the others have only a trace of side notches or stem. Such points easily became detached from the shaft and so could not be removed from a deep wound, which was therefore likely to prove fatal.

Number 29 is a flat piece of slate with rounded ends and bevelled on either edge following a natural cleavage plane which may have been ground to a sharp edge to make it serviceable as a scraper. Another interesting piece, not shown in the illustration, is a fragment of coarse gritty sandstone eight centimeters long by about two centimeters in width and a little less in thickness. It is roughly rounded on one side and has a shallow longitudinal groove on the other. This was used in smoothing arrow shafts, much as we would use sandpaper today. Number 30 of the illustration is not Indian work, but is a relic of the white pioneers. This is a gun flint, used in flintlock guns before the invention of percussion caps. The material is horn flint from the Cretaceous chalk deposits of England, where the quarrying and manufacturing of flints both of this sort and for domestic use with steel and tinder was at one time an important industry.

Two other specimens of gun flints have been recovered in the Arboretum.

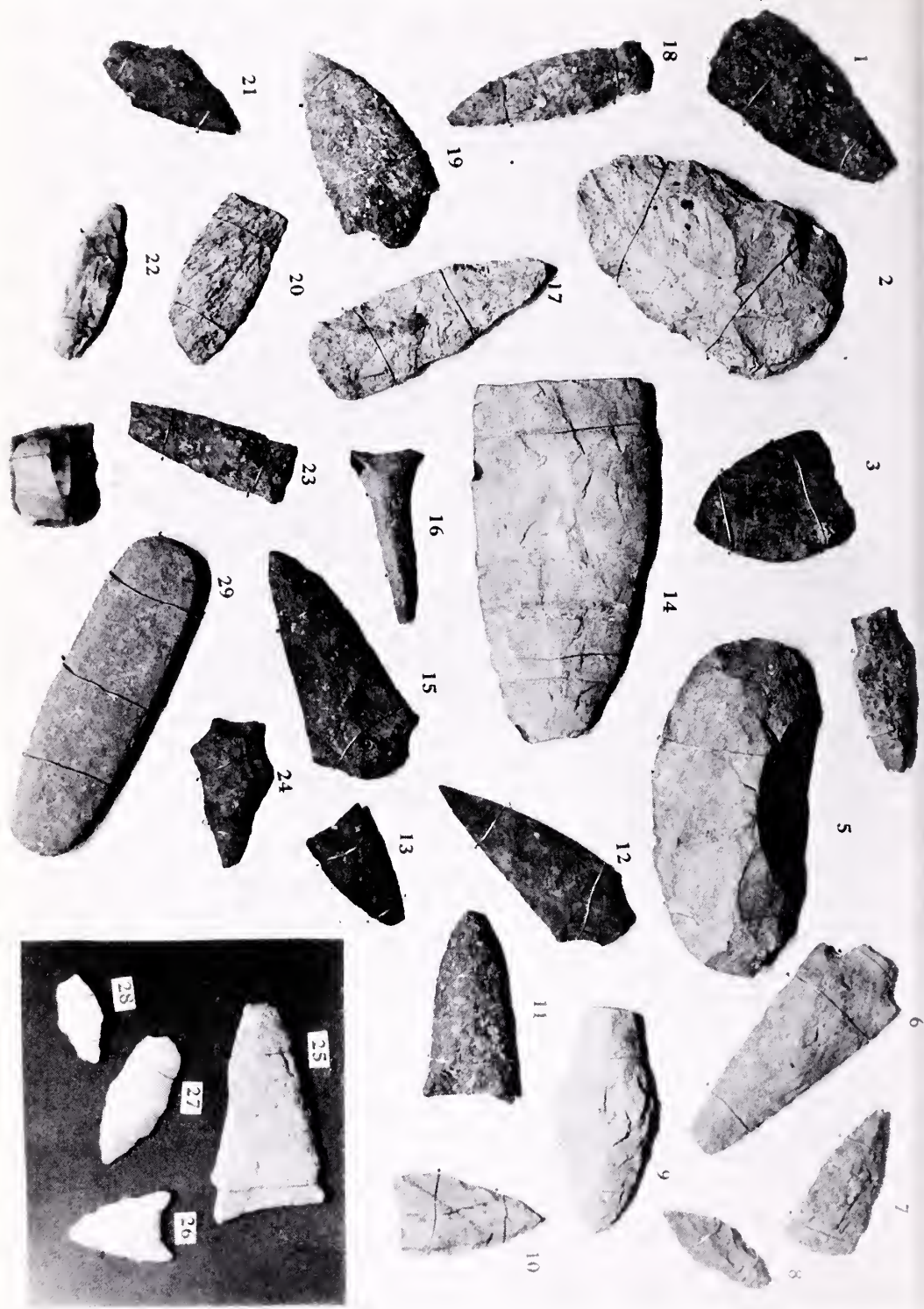
Most of the relics in the collection were found on the surface in the cultivated strips and beds where groups of shrubs are planted, or in the small plots dug up about individual trees and shrubs where the covering of grass, weeds, and leaves had been removed so that they could be seen. As the ground is turned up by the forks of the workmen the implements buried to a shallow depth are brought to the surface, and after a rain the earth may be washed off sufficiently for a sharp eye to detect them. Although only a small part of the Arboretum is cultivated in this way the spots are well distributed, giving a cross-section of the whole area; this has been sufficient to show that there are certain localities in which the relics are most abundant. Interpreting this with some knowledge of the needs of Indian life, and with allowance for the changes that we know have been made in the topography in recent years, it becomes possible to locate with considerable certainty the homes of these first inhabitants of the Arboretum area.

The most pressing needs of Indian life and the considerations that influenced them most in selecting sites for camps and villages were a nearby supply of drinking water, food, and fuel. They would also want a place that was comparatively open, well-drained, and as free as possible from rocks and brush that would have to be cleared away. A situation with a fairly level surface, near a perennial spring or running brook, shaded by large trees, and with an unobstructed view for some distance in all directions, would offer the maximum of advantages.

Any spot offering most of these attractions was almost certain to have been chosen as a camp site at some time. And if in addition it were situated on some bay, lake, or navigable stream, affording ready means of travel by canoe and an abundant food supply, it was quite likely to have been occupied by a permanent village. Looking over the land today and taking all of the factors into consideration, the trained eye of the archaeologist can locate such places, and he can predict with a considerable degree of certainty that Indian relics will be found there.

While scattered specimens of Indian relics have been found in a number of places in the Arboretum, the great majority of them have come from a few limited areas that were evidently occupied as camp or village sites. Nearly half of the pieces in the collection were picked up within the space of a few acres along Bussey Brook near the center of the Arboretum.

A slight rocky elevation, the upper part of which is still



1. Projectile point (base and point broken). Material, basalt-porphry. Top of Peters Hill.
2. Celt. Material, felsite-porphry. Foot of Hemlock Hill, east end.
3. Knife? Material, basalt-porphry. Spring Brook Village site.
4. Arrow point. Material, felsite-porphry. Spring Brook Village site.
5. Scraper. Material, chert. Border of meadow, near lindens.
6. Projectile point or knife. Material, quartzite. Hickory group.
7. Arrow point. Material, basalt-porphry. Top of Bussey Hill.
8. Arrow point. Material, argillite (slate). Along brook northeast of Administration Building.
9. Knife. Material, felsite-porphry. Spring Brook Village site.
10. Arrow point. Material, basalt. Spring Brook Village site.
11. Projectile point. Material, basalt-porphry. Centre Street border.
12. Projectile point. Material, basalt. Upper bench, Spring Brook Village site.
13. Arrow point. Material, basalt-porphry. Glacial esker, North Woods.
14. Knife or digging tool (broken at both ends). Material, chert? Meadow near Administration Building.
15. Projectile point. Material, basalt-porphry. Border of Meadow, near horse chestnuts.
16. Drill or reamer. Material, chert. Upper bench, Spring Brook Village site.
17. Knife. Material, felsite-porphry. Border of meadow, near lindens.
18. Projectile point or knife. Material, felsite-porphry. Border of former brook along Meadow Road, near corkwood.
19. Projectile point. Material, felsite-porphry. Spring Brook Village site.
20. Knife (point broken). Material, chert. Spring Brook Village site.
21. Arrow point. Material, basalt-porphry. Spring Brook Village site.
22. Arrow point (point broken). Material, chert. Upper bench, Spring Brook Village site.
23. Knife (point broken). Material, felsite-porphry. Spring Brook Village site.
24. Arrow point. Material, basalt. Foot of Hemlock Hill, east end.
25. Knife. Material, quartzite. Hickory group.
26. Arrow point. Material, quartz. Centre Street border.
27. Arrow point. Material, quartz. Centre Street border.
28. Arrow point (point broken). Material, quartz. Foot of Hemlock Hill, east end.
29. Knife or scraper? Material, argillite. Border of meadow, near lindens.
30. Gun flint. Material, horn flint. Border of meadow, near horse chestnuts.

covered by a remnant of the native forest of deciduous trees, extends from the boundary formed by Centre Street towards the brook. Ledges of Roxbury conglomerate outcrop in many places at the higher elevations near the street, and farther east the formation again comes to the surface, crossing the Valley Road and connecting with Bussey Hill. A perennial spring issues from the rocks at a point near the road forming a small rivulet that flows away across the meadow to join Bussey Brook. Towards the brook and in the triangle formed by the channels of the two streams the hill flattens out into a comparatively level bench or small plateau a few acres in extent, which is now occupied by plantings of various conifers and the juniper group. The drainage in this triangular area is good; the soil though thin in places is fertile, and under primitive conditions it was probably covered with open oak or mixed woods. A good outlook could be had up and down the little valley and across to Hemlock Hill, while a little farther up, the valley widened into what was evidently a small swamp or bog.

Such a place offered many advantages for a camp or small village site. The relative abundance of relics and fragments found here seems to indicate that it was occupied with some permanency. For even more significant than the finished implements are the small flakes or spauls of the different varieties of stone used by the Indians that have been picked up here. These spauls, having a characteristic conchoid fracture, were struck off from the small mass of stone in the process of manufacturing the chipped implements, and they afford an indubitable proof that such an industry was carried on where they are found.

The location of other Indian camps or lodges at several points in the Arboretum is indicated by the number of relics that have turned up. For although a stray arrow or spear may have been lost almost anywhere on a hunting or foraging expedition, such an accident could not account for the presence of a number of relics near one spot, especially when they include implements of domestic use or spauls. In addition to the Spring Brook Village site just described, relics have been found in the largest number along the slopes bordering the low meadow from near the Administration Building to the wooded hills beyond the linden and horse chestnut groups. Until comparatively recent times much of this low ground was occupied by a shallow lake or bog fed by several perennial brooks that have now, with one exception, been obliterated and the water carried under ground through sewers and conduits. Even now the lower part of this area is quite swampy and it becomes flooded in wet seasons, with the

water table near enough to the surface to afford homes for muskrats, no doubt the direct descendents of those that were trapped and hunted along with other game by the Indians who once camped along the borders of the bog and lake.

Another Indian camp seems to have been located on the ground level at the east end of Hemlock Hill near the South St. gate and extending across the street. The construction of roadways and other changes have obliterated most of this site, but several relics and fragments have been picked up in a small cultivated area just within the Arboretum wall and in the nursery across South Street. Scattered relics have also been found near the top of Peters Hill, on Bussey Hill, in the shrub collection, on the wooded ridges above the horse chestnuts, and at several other places.

People often ask how old these relics are. This cannot be answered definitely in regard to such relics as those found in the Arboretum. The hard stones from which most of the chipped implements were made are practically indestructible or yield very slowly to the disintegrating forces of time and weathering. The depth to which oxidation has penetrated some of the specimens indicates a considerable antiquity for them. Perhaps some of the pieces go back only to the time when the first European settlers began coming into the country or when the Indians abandoned their crude stone tools for the more efficient metal ones obtained by barter from the Europeans; others may have been made centuries earlier. All that we can say is that they are very old.

ERNEST J. PALMER

Ernest Jesse Palmer (1875-1962) was a naturalist of the old school. His interests in the aspect of nature were truly catholic. Despite the fact that his formal education ended with High School, and despite what we would term "hardships," he managed to become well versed in Latin and Greek, English literature, mathematics, economics, and poetry, as well as field natural history.

Palmer grew up in Webb City, in the Missouri coal mining country. At the age of 25 he made contact with the Arnold Arboretum, and for the rest of his working life was associated in one way or another with this institution. From 1901-1921 he collected for the Arnold Arboretum in the Middle West, notably in his home state of Missouri. From 1921 to 1948 he was Collector and Research Assistant, based in Jamaica Plain. In 1948, at the age of 74, he returned to his boyhood home in Webb City and continued an active life until his death at 87.

Prehistoric Land Use in the Arnold Arboretum

In the thirty-seven years since Ernest Jesse Palmer wrote his excellent report on "Indian Relics of the Arnold Arboretum" archaeologists have learned a great deal about Massachusetts prehistory.

It has been demonstrated beyond doubt that the styles of objects made by prehistoric men changed through time, as do the styles of things we make and use now. Through careful excavation of layers of food refuse and discarded tools, archaeologists have learned the order in which the many recognizable styles occurred through time. They have learned, also, which styles of spear points were in use with particular knife forms, or axe heads, or other tool types. The kinds of tools found together, the nature of the places where they are found, and the occasional traces of ancient houses and hearths have provided evidence about the way of life of the makers of the various tools. Human remains in graves with these tools show that the people who made them were of the same physical type as modern American Indians.

Physicists have provided archaeologists with a technique for directly dating organic material associated with prehistoric artifacts. The age of organic matter, ideally charcoal, can be estimated from the measurable activity of radioactive carbon isotopes, the decay rate of which is approximately known. The age of organic matter thus analyzed is usually expressed as a number of years before the present, and often converted by simple subtraction into a date in terms of the Gregorian calendar. Radiocarbon years as now calculated apparently do not exactly equate with calendar years (Ralph & Michael 1967); in general, the older the radiocarbon age the younger it is than the actual age. Age and date estimates quoted below will be in radiocarbon years and therefore minimal.

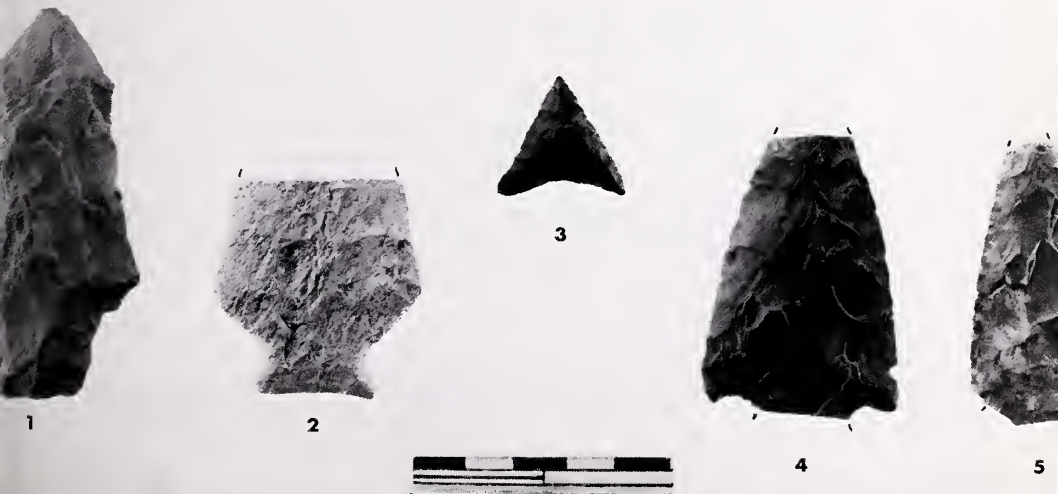
Geologists, zoologists, and botanists who concern themselves with prehistoric conditions have learned something about old landforms and ancient animal and plant communities in the

Boston area and have made inferences from such evidence about past climatic changes. It is clear that the Boston landscape, forest composition, and animal population have changed during the period of human occupation.

The Arboretum collection of Indian stone tools has been augmented since 1934 by occasional finds made by Palmer and by Mr. Alfred J. Fordham on the sites Palmer enumerated and by some pieces recovered from the grounds of the Biological Laboratory adjacent to the Arboretum on South Street.

The oldest tool styles in the collection are represented by the specimens numbered 6, 12 and 15 in Palmer's illustration, which are at least 5500 years old. These were followed 4500 years ago by spearpoints such as those numbered 4, 11 and 25, and by pieces like Nos. 8, 21, 22 and 26-28 (Ritchie 1969). A major new style appeared in southern New England about 4000 years ago, of which Figure I No. 1 is a representative. This particular spearpoint was originally wider, but has been narrowed by resharpening. By 3400 years ago, knives like No. 2 in Figure I were in use, with spearpoints like No. 24 in Palmer's illustration. Palmer's Nos. 18 and 20 were made between 3200 and 2600 years ago (Dincauze 1968). Figure I No. 5 is apparently of the same age, although it is not possible to be certain about it because of its broken base (Ritchie 1961:35). Number 4 of Figure I may be less than 2000 years old. Number 3 represents the last style in stone projectile points in the area; similar points were made of sheet brass and copper whenever the Indians could obtain the soft metals from Europeans.

By bringing to the Arboretum collection information obtained elsewhere (Ritchie 1969; Robbins 1968) we can see that Palmer's Spring Brook Village and Centre Street Border areas were occasionally occupied by small groups of Indians as early as the fourth millennium B.C. These areas even now offer some protection from extremes of winter temperature (A. Fordham,



personal communication) and Palmer has summarized other special attractions.

In the second millenium B.C. the Spring Brook, South Street and Meadow Border areas were foci for Indian activities. At Spring Brook, finds of stone flakes and unfinished tools indicate that tools were being made there and suggest that this was a dwelling area, not simply a camp site for hunters. The perforator (Palmer's No. 16) also suggests manufacturing or repair of domestic equipment, possibly sewing of leather or bark. Spring Brook Village may have been a winter camp site for one or two families at many different times. There is no evidence for the continued use of the Center Street Border area after 2000 B.C.

After 1000 B.C. the Spring Brook camp may have been abandoned for the Meadow Border area. It is in the latter vicinity that tools of the period from 1000 to 600 B.C. were found. There is no evidence in the collection for any camping activity in the Arboretum after this period. Of tools which can be confidently dated, only a few projectile points are younger than 600 B.C. Number 4 in Figure I was found on Peters Hill, a good place from which to watch for game and refit hunting equipment. This knife blade or spearpoint is especially interesting, as is No. 5, because both were made of cherts which outcrop in the Mohawk Valley of New York state and are forms more common there than in Massachusetts. The triangular arrowhead, No. 3 in Figure I, was also found on Peters Hill, where it was lost sometime during the last 300 years of Indian hunting there.

The Palmer-Fordham collection is obviously too small to support firm conclusions about prehistoric land use in the Arboretum, but it does suggest some interesting hypotheses. It appears that from a very early time the area was occasionally occupied by small groups of people who stayed for a number of days or weeks and carried on normal household activities. Sometime after 1000 B.C., people gave up living in the area, visiting only in the course of hunting expeditions. Indian horticulture was established in Massachusetts sometime around 1000 A.D., during the centuries when the Arboretum land was rarely frequented, so that it appears unlikely that any Indian gardens grew there.

While the earlier Indians were living in the Arboretum area, the landscape and environment of the Boston area were somewhat different from what we know. The sea-level was many feet lower when the first campers came, and it continued to rise toward its present height as the last of the continental glaciers



Figure II Bussey Brook Valley in the Arnold Arboretum, 1908. Photo: T. E. Marr.

melted, far to the north (Kaye & Barghoorn 1964). In the third millennium B.C., a large intertidal fishweir was constructed by the Indians on the mudflats of Back Bay, 20 feet below the tidal zone of modern Boston (Johnson 1949; Byers 1959:242). As the sea rose and buried the Back Bay weir, the mouth of the Muddy River became brackish and tidal. By the time the Indians gave up living at the Arboretum, the intertidal zone was far up the Charles River valley, just below its modern location at the Watertown bridge (Dincauze 1968:9).

Studies of old pollen deposits in southern New England have shown that during the second and third millennia B.C. the

deciduous forest composition was like that now found only south of the region, with a greater representation of hickories than in the forests which stood here in historic times (Davis 1965). Interpretation of this evidence is still debated, but it appears justifiable to see this period as a time of climatic amelioration, warmer and perhaps somewhat drier than the present average (Sears 1963). The abandonment of habitation in the Arboretum occurred at about the same time as the establishment of the modern forest association, which may indicate some deterioration of climate. Perhaps harsher winters forced the Indians to seek more shelter than the Arboretum sites offered. Deeper snows may have made this rough country inaccessible in winter. Whatever the reason for the change, abandonment of upland campsites at this same time has been noted elsewhere. Several sites in the Charles River basin show use almost continuously to 1000 B.C. and none later.

For the two thousand years before the English came to cut hay, the Arboretum land was a swampy backwoods area, home to muskrats and other wild animals, attracting an occasional human hunter.

DENA FERRAN DINCAUZE

Dr. Dena Ferran Dincauze is Assistant Curator of North American Archaeology and Thaw Fellow at the Peabody Museum of Archaeology and Ethnology of Harvard University. A Study of Indian settlement in the Charles River watershed first brought her to the Arnold Arboretum. We consider ourselves fortunate to have Palmer's work on "Indian Relics . . ." brought up to date and placed in its proper context.

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The Lelacke, or Pipe Tree

In Le Mans, France, there is a statue of a man with long curly hair, seated, reading a book. It is a statue of Pierre Belon, a French naturalist born about 1517, and, as far as we know, the first European to describe the lilac.

As a young man Pierre Belon studied medicine in Paris, and after receiving his doctor's degree he became a pupil of the German botanist, Euricius (or Valerius) Cordus, and travelled with him throughout Germany. He returned to France when he was about 29 years old, and his ability and knowledge attracted the attention of two Cardinals, Tournon and Chastillon, who became his patrons. Financed by them the intrepid young man set out on an extensive journey of scientific discovery to Greece, Asia Minor, Egypt, Turkey, Arabia, and Palestine. After his return Belon published in 1553 a full account of his travels. Writing of the Turkish people's fondness for flowers, he described a bush with flowering branches the length of an arm, of violet color, which the Turks called Foxtail, the bush which we now call lilac.

It was only two years later, in 1555, that a Flemish scholar, Augier de Busbecq, went to Constantinople, sent by the Emperor Ferdinand I, as Ambassador to Suleiman II, Sultan of Turkey. Busbecq lived in Constantinople for eight years. When he returned to his home in Vienna he brought with him many plants from Turkey including the lilac which he grew in his garden. The Viennese gave it the name *Türkisher Holunder* (Turkish Elderberry).

Word of the new plant soon reached Italy. A physician of Siena, Pietro Andrea Mattioli, was publishing a series of commentaries on the first-century writings of Dioscorides (who was still, in the 16th century, an authority on medicine) and in the 1565 edition of his Commentaries he published a woodcut of a plant he called "lilac," and stated that the plant was brought from Constantinople by Busbecq. The picture, although inaccurate in showing flowers and fruits on the same branch, was the first published picture of the lilac. In a later edition of the Commentaries, in 1598, Mattioli published a more accurate il-



lustration, after he had received flowering and fruiting branches from Giacomo Cortusi, head of the Botanic Garden at Padua.

There is no doubt that the new bush proved popular. In 1597 John Gerard, surgeon and gardener (and author of Gerard's *Herball*) reported it in his garden in England "in very great plenty," and by 1601 it was well established in western European gardens and had escaped and become naturalized.

The white lilac must have appeared about this time; it was first mentioned by Basil Besler, a German botanist, in 1613, and its origin is unknown. In 1629 John Parkinson, a writer and gardener in England, referred to a "Pipe tree . . . of a milke or silver colour, which is a kind of white . . . coming somewhat neare unto an ash-color."

Lord Bacon, in an essay on gardening written in 1625 referred to the Lelacke tree. It was also called Laylock, Lilach, and Pipe-tree. The name *lilac* may have come from *lilaj*, the Turkish name for the indigo plant, or from *lilak*, meaning bluish. The Latin name for the lilac, *syringa*, was used by a French botanist, Mathieu de l'Obel (Lobelius), in 1576. Alfred Rehder, an American authority on trees and shrubs, suggested that the name came from the Greek word *syrix*, meaning "pipe," referring to the hollow stems of *Philadelphus* (mock orange) which were used by the Turks to make pipes. Both the lilac and the mock orange were originally placed in the genus *syringa* and the name pipe tree was used indiscriminately for both.

It is reasonable to believe that the lilac appeared early in Spain, as l'Obel wrote of a lilac, *Syringa caerulea Lusitanica*, *Lusitanica* referring to the part of the Iberian peninsula now known as Portugal. It is quite possible that the lilac came to Spain with the Moors, in fact an Arab botanist, Serapio, mentioned *Jasminum caeruleum* (Blue Jasmine) in the eleventh century. Later, in the 16th century the name of *Jeseminum caeruleum Arabum* appeared as a synonym for the common lilac, *Syringa vulgaris*. Many of the features of Moorish gardens in Spain had their origins in Persia, coming by way of Egypt. Egypt was conquered by the Persians in 525 B.C. and remained under Persian domination for about two centuries, during which time there was a continuous interchange of ideas between the two cultures. When the Moors went to Spain from north Africa in the eighth century they took their art and architecture with them, and it is conceivable that the Blue Jasmine mentioned by Serapio was brought to Spain at an early date. The Moors, in their almost eight centuries in the Iberian peninsula, penetrated

Top: *Syringa chinensis* in the Arboretum.

Bottom: *Syringa persica*.



into the central and northern areas, where lilacs at present do grow (such as in the Parque del Oeste, Madrid).

In 1753 Linnaeus standardized the Latin name of the common blue lilac as *Syringa vulgaris* and gave its native land as the Orient, although there was a belief among some botanists of that day that it came from Persia. It was not until 1828 that the naturalist Anton Rochel found it growing wild in western Rumania, and within a few years it was reported growing wild along the Danube river and in Bulgaria. In spite of this, the belief that it was from Persia or China continued into the twentieth century. However in 1903 J. Lochot, who was in charge of the gardens of the Prince of Bulgaria, wrote of traveling through the Balkans and seeing it growing wild. Three of the plants collected by Rochel at that time were brought to the Arnold Arboretum.

The lilac which is referred to as the Persian lilac was first described by John Bauhin, a Frenchman. He described it in 1619 as a lilac with cut leaves, which he received from a Venetian who grew it in his garden. He gave it the Latin name of *Ligustrum foliis laciniatis*. It appeared again in a book published in 1627 by an Italian botanist, Prosper Alpinus, who reported that it was sent to Venice by Jerome Capelli. Apparently Capelli was ambassador to the Sultan, so this lilac also appears to have been introduced by way of Constantinople.

A Persian lilac with entire leaves was reported in 1660, listed in a catalog of the Jardin des Plantes, Paris, as *Jasminum persicum seu ligustrum persic*. (The Jardin des Plantes later became part of the Musée d'Histoire Naturelle.) No record has ever been found to indicate where this plant came from.

Linnaeus in 1753 based his description of the Persian lilac, *S. persica*, on a specimen with entire leaves, and at the time many botanists included the cut-leaved form and the entire-leaved one in the same species, since it was recognized that certain of the plants had both kinds of leaves. Toward the end of the 1700's one German writer suggested that the Persian lilac came from China, by way of Constantinople, later than *S. vulgaris*; and in the early 1800's the belief grew that it was not a native of Persia, as it was only found there as a cultivated plant. In 1770 Richard Weston referred to the Persian lilac with cut leaves as *S. persica* variety *laciniata* and finally it was accepted as such by most botanists. In 1922 a specimen of this plant was collected in Kansu, China, which had two branches, one with entire leaves, and one with both cut leaves and entire leaves. This specimen is preserved in the herbarium of the

Arnold Arboretum. Mrs. Susan Delano McKelvey in her monumental monograph of the lilac suggested that *S. persica* with entire leaves only, is a garden plant, not appearing in the wild. Many plants were carried from China to Persia: walnuts, grapes, peaches, and many others, and Mrs. McKelvey suggested that the cut-leaved type was brought along with them, and that the form with only entire leaves may have originated in a Persian garden as a seedling or sport, or was propagated from a branch or twig which bore only entire leaves.

In the Botanic Garden of Rouen in the 1700's both the Persian lilac and the common lilac bloomed simultaneously. In about 1777 a third lilac appeared there, which was later given the misleading name of *S. chinensis*. This plant has since proved to be a hybrid of *S. persica* and *S. vulgaris*. Jacques Varin, the director of the Botanic Garden, for several years sowed the seed of the cut-leaved Persian lilac, and obtained what he considered a degenerate variety, unaware that what he really had was a hybrid.

In America the common lilac was quickly adopted and became quite popular in the eighteenth century. Lilacs were grown in the garden of the mansion of Governor Wentworth in Portsmouth, N.H., which is believed to have been planted in 1750. The garden book of Thomas Jefferson written at Shadwell, Virginia, on April 2, 1767, mentioned planting lilacs and Spanish Broom, and even earlier Peter Collinson wrote on December 20, 1737, to his botanist friend in America, John Bartram, "I wonder that thou should be sorry to see such a bundle of white and blue lilacs . . . But as your neighbours of Virginia, in particular Colonel Custis at Williamsburgh, who has undoubtedly the best collection in the country, desired some, I thought possibly you might want them . . . But does thee know that there is both blue and purple Lilacs?"

George Washington was fond of lilacs and in 1785 set out plants along the walks in his garden, and in March, 1792, purchased lilacs from John Bartram to plant on the bowling green.

About 1800 Bernard M'Mahon, Seedsman of Philadelphia, offered two lilacs, white (*S. alba*) and purple (*S. violacea*) which were in reality forms of the common lilac. Fifteen years later W. P. G. Barton mentioned lilacs among plants collected within ten miles of Philadelphia, in a flora of native plants and others "either naturalized or so commonly cultivated among us that it has been deemed expedient to introduce them into this Prodrum."

The annual catalog of William Price and Sons, Flushing, Long

Island, New York, of 1835, listed eleven lilacs: White lilac, Ditto extra large, Great white flowered, Blue or purple, Red, Charles the Tenth *superb new*, Purple Persian, White Persian, Persian cut leaved, Large Chinese or Siberian, and Large flowering hybrid.

As plant explorers traveled through the world more lilacs appeared. Rosalia, Baroness von Josika, recognized, before 1830, that a lilac growing in Transylvania was distinct from those already known, and it later became *Syringa josikaea*. Robert Fortune brought back from China *Syringa oblata* in 1856. Two Russian explorers, Richard Maack and Carl Johann Maximowicz, independently discovered *Syringa amurensis* in Amur, eastern Asia, and its variety the Japanese tree lilac (var. *japonica*).

By 1889 Parsons and Sons, of Flushing, listed forty-six lilacs, the price from twenty-five to fifty cents each. A recent catalog of a Massachusetts grower has seventy-two.

Among the many lilacs grown today, there occasionally appear individual bushes, or groups of bushes which differ in color, blossom size, or other characteristics, and each year horticulturists present those of the new lilacs which they believe are worthy of cultivation and whose characteristics will persist. These are given names by the discoverer and are registered as new "cultivars." Along with the new lilacs however the nursery catalogs continue to list *josikaea*, *amurensis*, and other old favorites.

As one drives along the fast-disappearing country roads old lilacs can be glimpsed among the underbrush at the site of old farmhouses, recalling Thoreau's words, "Still grows the vivacious lilac a generation after the door and lintel and sill are gone."

HELEN ROCA-GARCIA

1970 Lilac Registrations

During the Fifteenth International Horticultural Congress in Nice, France, in 1958, the Arthur Hoyt Scott Horticultural Foundation, Swarthmore College, Swarthmore, Pennsylvania 19081, was designated to be the International Registration Authority for Lilacs.

The names of species, hybrids and cultivars published in "Lilacs for America" in 1953 were accepted as registered. Subsequent registrations were published in *Arnoldia* (and elsewhere) in 1963, 1965, 1966 and 1967.

- S II Agincourt Beauty — L. K. Slater, Agincourt, Ontario, Can. About 1968.*
- S I Agnes Smith — O. M. Rogers, Univ. New Hampshire, Durham, N.H.
- S I Alexander's Attraction (EH-G) — J. H. Alexander, Middleboro, Ma. 1968.
- S V Alexander's Variegated (PR) — J. H. Alexander, Middleboro, Ma. 1968.
- S VII Alice Franklin — F. Barnes, Julian, Calif.
- S V Alice Rose Foster (PR) — J. H. Alexander, Middleboro, Ma. 1968.
- S V Basia (PR) — W. Bugala, New varieties of *Syringa prestonae* McK. obtained in the Kornik Arboretum. In Polish, with summaries in English and Russian. *Arboretum Kornickie* 15: 61-69. 1970.

* The format of the present list follows that used in "Lilacs for America" as to the Abbreviations and Symbols.

- | | |
|---|--------------------|
| S — Single flowers | D — Double flowers |
| I — White II — Violet III — Bluish IV — Lilac V — Pinkish | |
| VI — Magenta VII — Purple | |

If there are no capital letters in parenthesis following the name, the cultivar is a form of *Syringa vulgaris*. Cultivars of other species or hybrids have parenthesis () with two or three capital letters as follows:

- (EH-D) — Early Hybrids (*S. vulgaris* × *S. oblata dilatata*)
- (EH-G) — Early Hybrids (*S. vulgaris* × *S. oblata giraldei*)
- (JF) — (*Josiflexa*) (*josikaea* × *reflexa*)
- (PR) — (*Prestoniae*) (*villosa* × *reflexa*)

- S III Blue Delight — M. Castle, Rowancroft Garden, Meadowville, Ontario, Can. 1969.
Bright Centennial — E. Robinson, Gaybird Nursery, Wawaesa, Manitoba, Can. 1967.
- S V Cynthia — K. Berdeen, Kennebunk, Me.
- S V Danusia (PR) — W. Bugala, see cv. Basia for reference.
Dappled Dawn (Patent #2614) — C. J. Hauck, Hauck Botanic Garden, Cincinnati, Oh. 1966.
- S IV-V Diana (PR) — W. Bugala, see cv. Basia for reference.
- S III Dwight D. Eisenhower — R. A. Fenicchia, Dept. Parks, Monroe Co., Rochester, N.Y.
Eaton Red — M. Eaton, Glen Head, N.Y.
- D V Elaire Brown Alexander (EH-G) — J. H. Alexander, Middleboro, Ma.
Elizabeth Files — K. Berdeen, Kennebunk, Me.
Eliose (PR) — J. H. Alexander, Middleboro, Ma.
- S V Esterka (PR) — W. Bugala, see cv. Basia for reference.
- D III Far Horizon — E. G. Polin, Fultonville, N.Y.
- S V Ferna Alexander (PR) — J. H. Alexander, Middleboro, Ma.
Florence — Mrs. Betty Stone, Ashland, Oh.
- S V Goplana (PR) — W. Bugala, see cv. Basia for reference.
Haghy (*wolfi* × *reflexa*) — A. Olsen and Prof. K. Gram, Copenhagen, Denm.
Hazel — Mrs. J. Lyden, North Monmouth, Ma., and J. H. Alexander, Middleboro, Ma.
Jack Alexander — J. H. Alexander, Middleboro, Ma.
- S II Jaga (PR) — W. Bugala, see cv. Basia for reference.
- S II-IV Jagienka (PR) — W. Bugala, see cv. Basia for reference.
Jill Alexander (PR) — J. H. Alexander, Middleboro, Ma.
- S V Judy's Pink (EH-D) — R. de Wilde, Doylestown, Pa.
Kum — Bum (*tomentella*) — Rev. J. L. Fiala, Media, Oh.
Leone Gardner — Gardner Nursery, Horicon, Wisc.
Lillian Davis — Mrs. Betty Stone, Ashland, Oh.
- D III Lynette Sirois — K. Berdeen, Kennebunk, Me.

- S V Lustrous — Mabel L. Franklin, Minneapolis, Minn.
Mary Ann Gardner — Gardner Nursery, Horicon, Wisc.
- S V Mary Evelyn White (PR) — J. H. Alexander, Middleboro, Ma.
- S V May Day — J. Clarke Nursery, San Jose, Calif. Before 1967.
Mount Domogled — Robert B. Clark, Monroe County Park System, Rochester, N.Y.
Mrs. Charles Davis — Mrs. Betty Stone, Ashland, Oh.
- S II Nike (PR) — W. Bugala, see cv. Basia for reference.
Old Fashioned — J. Clarke Nursery, San Jose, Calif.
- S V Phyliss Alexander (PR) — J. H. Alexander, Middleboro, Ma.
- D VI Polly Stone — Gardner Nursery, Horicon, Wisc.
Ralph W. Stone — Mrs. Betty Stone, Ashland, Oh.
- S I Rochester — Correction. The 1965 Registration should read "Grant, Monroe County Park System, Rochester, N.Y."
Royalty — Listed in 1953 as JF (Josiflexa) and in 1963 was changed to PR (Prestoniae). This classification is still under dispute; it seems possible that two different cultivars were sent out under this name.
- D II Starlight — E. G. Polin, Fultonville, N.Y.
- S V Stropkey Variegated — J. Stropkey Nursery, Painesville, Oh.
- D III Sweet Refrain — Mabel L. Franklin, Minneapolis, Minn.
- S V Telimena (PR) — W. Bugala, see cv. Basia for reference.
- S VI Tit Tat Toe — T. A. Havenmeyer and Mark Eaton, Glen Head, N.Y.
- S V Vivian Christenson (PR) — J. H. Alexander, Middleboro, Ma.
- S II Violet Glory — M. Castle, Rowancroft Garden, Meadowville, Ontario, Can.
- S I White Sands — Gardner Nursery, Horicon, Wisc.
- S III Woodland Blue — L. Hancock, Woodland, Nursery, Mississauga, Ontario, Can.



The following cultivars were imported from Russia by the Arnold Arboretum. The original publications using these names were discussed by R. A. Howard (*Arnoldia* 19: 31-35. 1959) and by R. A. Howard and G. K. Brizicky (*Quarterly Newsletter*, AABGA, Issue 64: 15-21. 1965).

- S I Galina Ulanova — Kolesnikov, Moscow. 1953.
- ? II Gotensiia — Kolesnikov or Gromov, Moscow. 1963.
- S VI India — Gromov, Moscow. 1955.
- D I Ivan Michurin — Kolesnikov, Moscow. 1941.
- D V Izobiliie — Kolesnikov or Gromov, Moscow. 1963.
- S VII K. A. Timiriazev — Kolesnikov or Gromov, Moscow. 1963.
- D IV Kapriz — Kolesnikov, Moscow. 1952 or 1961. See Brizicky, *Quarterly Newsletter*, AABGA. Issue 64: 22. 1965.
- D I Krasavita Moskvyy — Kolesnikov or Gromov, Moscow. 1963.
- D V Marshal Vasilevskii — Kolesnikov, Moscow. 1963.
- D VI Niebo Moskvyy — Kolesnikov or Gromov, Moscow. 1963.
- D I? Olimpiada Kolesnikova — Gromov, Moscow. 1955.
- D II Pamiat o S. M. Kirove — Gromov, Moscow. 1963.
- S VII Pioneer — Gromov, Moscow. 1951.
- S ? Sumierki — Kolesnikov, Moscow. 1954.
- S VII Zarya Kommunizma — Kolesnikov, Moscow. 1951.
- S ? Znamia Lenina — Kolesnikov or Gromov, Moscow. 1963.

The following cultivars were imported from the Kornik Arboretum, Kornik, Poznan, Poland, by the Royal Botanical Garden, Hamilton, Ontario, Canada, in 1968-69. The cultivar names attributed to Karpow were developed by Kikolaj Karpow-Lipski, Chelmza, Poland, between 1948 and 1958. The names appear to be first used in the Year Book, Kornik Arboretum, for 1968-1969.

- D IV Adam Mickiewicz — Karpow. 1958?
- D I Anna Karpow — Karpow. 1958?
- D VI Bogdan Przyrzykowski — Karpow. 1961.
- S V Dr. W. Bugala — Karpow. 1962.
- D III Fale Baltyku — Karpow. 1961.
- D IV Irene Karpow-Lipska — Karpow. 1958?
- S V Jutrzenka Pomorza — Karpow. 1961.
- D IV Kobierski — Karpow. 1960.

- D V Konstanty Karpow — Karpow. 1953.
 S II Leonid Leonov — Kolesnikov, Moscow. Before 1959.
 S VI Leon Wyczolkowski — Karpow. 1958.
 S II Malachow — Kolesnikov, Moscow. 1955.
 S II Mieczta — Kolesnikov, Moscow. 1941.
 S III Minister Dab Kociol — Karpow. 1961.
 D V Niewinnosc — Karpow. 1960.
 D II Pamiat o S. M. Kirove — Gromov, Moscow. 1955.
 D I Panna Dorota Golabecka — Karpow. 1952.
 D VI Piotr Chosinski — Karpow. 1960.
 S III Pol Robson — Kolesnikov, Moscow. 1965.
 S V Pomorzanka — Karpow. 1962.
 D V Prof. Bialobok — Karpow. 1961.
 S III Prof. Edmund Jankowski — Karpow. 1958.
 D III Prof. Hoser — Received at Kornik Arb. about 1930
 from P. Hoser of Warsaw.
 D V Prof. Josef Brzezinski — Karpow. 1938.
 D IV Prof. Roman Kobendza — Karpow. 1958.
 S V Rozana Mlodosc — Karpow. 1960.
 S VI Stefan Makowiecki — Karpow. 1958?
 D VI Tadeiszko — Karpow. 1954.

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Notes from the Arnold Arboretum

Perennials for

Low Maintenance Gardening

Part III

Iris — Iris, Fleur-de-lis

Irises are similar to Daylilies in that there are so many available varieties to choose from that one hardly knows where to begin. For the low maintenance garden the similarity ends here because the Tall Bearded Iris, the most popular of the group, cannot be called an undemanding plant. Clumps may start to degenerate after the third or fourth year and division of these, preceded by a thorough preparation of the new site, may be necessary.

The Iris borer, a worm which tunnels into the rhizomes, can cause serious trouble and is more difficult to control now that DDT is not used. A short blooming period restricts the use of irises in most mixed borders, but when planted for mass effects the results are delightful. When used sparingly in a mixed border, the leaves of irises form good contrasts to the foliage of many other types of plants.

According to the Popularity Poll in the October 1970 issue of the *Bulletin of the American Iris Society*, some of the best varieties to watch for in catalogs are as follows: *I.* 'Stepping Out' — this is basically a white flower which is heavily overlaid with deep blue-purple edges to the flower segments; *I.* 'Winter Olympics' — to date the finest pure snow-white flowered bearded iris; *I.* 'Rippling Waters' — a blend of pale lavender-blue; *I.* 'Esther Fay' — a very husky growing variety with pink flowers; *I.* 'Dusky Dancer' — one of the most popular of the so-called black varieties, the flowers being a deep purple-black; *I.* 'Ultrapoise' — the most popular yellow; *I.* 'Ginger Snap' — the best brown; and *I.* 'Christmas Time' — snow-white with a fiery red beard.

Of greater value in the low maintenance garden are the less numerous cultivars of the Siberian Iris, *I. sibirica*. Many of these will survive in poor soil, but do better where soil condi-

tions are rich and moist, and although they will withstand light shade, they are at their best in full sun. A few of the good newer varieties are: *I.* 'Gatineau' — large violet-blue flowers; *I.* 'Ruby Wine' — bright ruby-red flowers; *I.* 'White Swirl' — satin-white in abundance; and *I.* 'White Magnificence' — very large white flowers.

Kniphofia — Torch-Lily, Red-Hot Poker

Kniphofia uvaria is probably the best known species, and although still commonly offered it is not entirely compatible with New England winters, and its bright red and yellow flowers are thought to be overly gaudy by many people. This somewhat unsavory reputation is no longer fully deserved as breeders have developed new cultivars which are hardier and have a better range of softer colors.

All Torch-Lilies require sandy, perfectly drained soils. Soggy conditions are fatal, and although a position sheltered from the wind should be selected, they should be situated so as to receive as much direct sunlight as possible. Divisions obtained from nurseries are usually quite small and it will take a few years for them to become established. Plants grow from two to three feet tall, have a somewhat coarse appearance, and are best seen as single specimens rather than massed.

Some of the interesting new varieties which should be tried are: *K.* 'Earliest of All' — coral-rose; *K.* 'Maid of Orleans' — pale yellow; *K.* 'Primrose Beauty' — primrose-yellow; *K.* 'Springtime' — flowers in the upper part of the spike are coral-red, those below are ivory-white; and *K.* 'Summer Sunshine' — flame red.

Liatris — Blazing Star, Gayfeather

It is rather unusual that a member of the Daisy family should have flowers which are arranged in a dense spike formation. These spikes seldom fail to attract attention because the flower heads at the top open first, and flowering progresses down the stem rather than up. Exceptions to this are *L. scariosa* 'September Glory,' which produces five-foot spikes of purple flowers which open all at the same time, and its sport *L.* 'White Spire' which has white flowers. Although all the commonly grown species produce excellent flowers for cutting purposes, these two cultivars are probably the best. It should be noted, particularly with the shorter-growing varieties, that at least one third of the stalk should be left on the plant after cutting. This will leave sufficient foliage for the manufacture of food reserves.

Liatris are stiff, upright plants which look best when planted

sparingly rather than as large masses. They will tolerate considerable moisture during the growing season, but soggy soil conditions during the winter will lead to rapid deterioration of the clumps. (This is particularly important with *L. pycnostachya*, *L. scariosa*, and their several cultivars.) A moderately fertile sandy soil and a position in full sun are about the only other requirements for *Liatris*.

Stems of the taller growing *L. pycnostachya*, *L. scariosa* 'September Glory' and *L.* 'White Spire' have a tendency to lean over under their own weight and require staking. For the low maintenance gardener, several other species and cultivars which do not possess this objectionable characteristic can be recommended. *L. spicata* with purple flowers in August forms fairly dense clumps with three-foot spikes; *L. spicata* 'Kobold' is only eighteen to twenty-four inches high, and has dark purple flowers; *L. spicata* 'Silver Tips' grows to three feet tall with flowers more nearly lavender in color. *L. punctata*, the Dwarf Gayfeather blooms in August and seldom exceeds two-and-a-half feet in height.

Limonium — Sea-lavender, Hardy Statice

When grouped closely together, plants of *Limonium latifolium* will form an attractive and somewhat unusual groundcover. When grown in the herbaceous border they may be counted upon to develop into long-lived specimens which will withstand considerable neglect.

Established plants bear large panicles of numerous small flowers. These are frequently up to one-and-a-half feet across and can be used effectively in dried flower arrangements. In time, a clump may have up to a dozen sprays and form a spectacular canopy nearly a yard wide. Sea-lavender may be used in much the same way as *Gypsophila* (Baby's Breath) to impart a light, airy effect in the garden, and is an excellent substitute in areas where *Gypsophila* does not overwinter well.

It is a fitting subject for gardeners near the sea, and inland the major requirement is that plants be grown in a light sandy loam in a sunny position. If planted in a heavier soil, stems will invariably be weak and require staking.

Limonium latifolium blooms from July through August and produces bright mauve-lavender flowers. Two cultivars which somewhat extend the color range are easily available. These are *L. latifolium* 'Colliers Pink' with pink flowers, and *L. latifolium* 'Violetta' with clear violet-blue flowers.

Lupinus — Lupine

Of the several types of Lupine which are hardy, the strain known as *Lupinus x regalis* 'Russell Hybrids' is by far the showiest. These cannot be recommended for general cultivation in our area, however, because of their sensitivity to hot summers. They do best in cool, humid areas such as northern New England and the Pacific Northwest. It has been said that *L. cytisoides*, the Canyon Lupine from California, might be crossed with the 'Russell Hybrids' to produce a more heat-resistant strain. Until this is done, or summer hardiness is achieved in some other way, gardeners in the Boston area and south should probably avoid Lupines.

Lychnis — Campion, Catch Fly, Maltese Cross

Although this group produces some of the most vividly colored flowers of any in the herbaceous border, the so-called perennial species are quite short lived and are of no value in a low maintenance garden. *Lychnis coronaria*, the Rose Campion, usually behaves as a biennial and seeds itself in such a copious manner that it may have some value in certain situations where many chance seedlings would not look out of place.

Lysimachia — Loosestrife

Most members of this genus would not look well in a manicured formal border, but the somewhat spreading (sometimes invasive) tendencies of the more commonly grown species may be a distinct asset in gardens which are to receive minimal care.

They are of easy culture and adaptable to a wide range of conditions.

Lysimachia clethroides, the Gooseneck Loosestrife, bears three-foot stalks of white flowers which are both attractive and interesting because they bend at the top in a somewhat gooseneck fashion. They last well and can be used for flower arranging. This is not a plant for confined spaces and it would be unwise to place choice smaller plants nearby or to expect it to fit into any ordinary-sized niche in the border. When naturalized, or planted in light shade near the base of shrubs, however, they will be seen to full advantage.

Lysimachia punctata, the Yellow Loosestrife, produces sturdy three-foot stems which have axillary whorls of bright yellow flowers over most of their length during June and early July. It does not spread as rapidly as *L. clethroides*, and although best in partial shade, it will tolerate full sun if planted in rich, moist

soil. Another Loosestrife with yellow flowers is *L. vulgaris*, whose flowers are borne in terminal panicles during late July and August. This species will not tolerate exposure to full sun, and partial rather than dense shade will suit it best.

Sometimes called Creeping Jenny or Moneywort, *L. nummularia* is a European plant now widely naturalized in North America. Were it not for its overly invasive tendencies, this would probably be one of our best ground covers, but it should not be planted where it cannot easily be contained. *L. nummularia* 'Aurea' is sometimes offered in catalogs as an unusual bedding or ground cover plant. The leaves are a garish yellow, difficult to combine attractively with other colors.

Lythrum — Purple Loosestrife

Lythrum salicaria, a native of Europe, is now so widely naturalized in our area it is difficult to believe that it has only recently become such a feature of our landscape. Those who travel along Route 128 in the Boston area during mid to late summer cannot fail to notice the vast expanses of rosy magenta flowers in the low, moist places.

A number of selections have been made from the wild forms. These are well worth growing, especially in difficult wet areas in the garden. *Lythrum* 'Morden Pink' is a bud sport which originated at the Dominion Experiment Station, Morden, Manitoba, Canada. The restrained, three-foot plants are excellent subjects for the border as they flower nearly all summer long. Flowers are rose-pink. This cultivar is sterile (seeding can be a nuisance with some varieties), but clumps increase in size fairly rapidly. Other cultivars include: *L.* 'Morden Gleam' with deep carmine flowers; *L.* 'Morden Rose' with sparkling deep rose-pink flowers; *L.* 'Robert' a very interesting two-foot dwarf with rose-red flowers which, unfortunately, is not as floriferous as the others; and *L.* 'Dropmore Purple' which has rather poor, muddy, dark pink flowers if planted in a hot place.

The great value of this group is its hardiness and ability to survive without much attention for a long period of time. Although they are often used to advantage in moist areas, the plants will thrive in ordinary border conditions. They will also tolerate a considerable amount of shade.

Macleaya — Plume-Poppy

Macleaya cordata (listed in many catalogs as *Bocconia cordata*) cannot be considered for low maintenance plantings where the soil is rich and shady conditions prevail. Under these circumstances, Plume-Poppies spread at such a rate that much

time will be spent reducing the size of the clumps. Better results will be obtained in a sunny position where the soil is of average to slightly below average fertility. Even then, it must be remembered that this is a large plant which produces spikes fully six to eight feet tall and clumps three to five feet in diameter. Under these latter conditions, however, Plume-Poppies should develop into magnificent, long-lived specimens which should not have to be disturbed for many years.

The most striking features of the Plume-Poppy are its large, bold, scalloped leaves which are almost tropical in their effect. Their appearance is further enhanced by being light green above and gray-white on the under surfaces, a pleasing combination when they are blown about by a light wind. Although a member of the Poppy family, the name may be confusing, as the flowers bear no resemblance to the true poppies. They are small, cream-pink to buff colored and appear on elongated panicles in July and August.

In the border, they must be situated toward the rear where the leaves will not be as effective as when seen among shrubs or naturalized in a semi-wild area.

Monarda — Beebalm, Bergamot, Oswego Tea

Although the several leading cultivars of *Monarda didyma* are excellent subjects for herbaceous borders they have a shallow root system which spreads rapidly. Unless divided at fairly frequent intervals (at least every third year), plants will degenerate into rather unkempt clumps with decidedly tatty foliage.

Monarda didyma 'Granite Pink' (a seedling of *M.* 'Croftway Pink') which was introduced by the University of New Hampshire, is much more compact in habit of growth and should not require such frequent division. Also, the foliage at the end of the growing season was far superior to that of other cultivars of the same age grown at the Arboretum last year. Those who have given up *Monarda* may wish to try this relatively new cultivar which is now easily available.

Monarda will tolerate considerable moisture during the growing season, but should be in a soil which drains freely during the winter. This is a member of the Mint family and both the leaves and the flowers are quite fragrant, the flowers on two-and-a-half- to three-foot spikes being especially useful in arrangements. Some of the cultivars available are: *M.* 'Cambridge Scarlet' — probably the most popular, with bright scarlet-red flower heads; *M.* 'Croftway Pink' — a clear rose-pink; *M.* 'Ma-

hogany' — deep wine-red; and *M.* 'Salmon Queen' — salmon-pink.

Oenothera — Evening-Primrose, Sundrop

Annuals, biennials, and perennials can all be found in this large group. Some are rank weeds, others are variously used for naturalizing, in rock gardens, or in the perennial border. None of the perennial species are presentable in situations where they cannot be divided frequently and should not be included in a planting which is to receive limited attention.

Paeonia — Peony

Peonies are perhaps the most fitting of all the plants discussed here for the low maintenance garden. The relative ease of culture combined with an exceedingly long life, great hardiness, and their popularity as cut flowers make them nearly indispensable.

Plants which are to last a long time in one spot (thirty years and sometimes more) require a deep, rich, well-drained soil. Plenty of humus should be incorporated at planting time, but manure should never come in contact with the thick, fleshy root system. Divisions should contain at least three to five buds ("eyes") at the top of the roots, and these should be set about one inch below the soil line. Deeper planting frequently leads to poor flowering, or no flowers at all. Late August or early September is the preferred time for transplanting, and although a site in full sun is usual, the more delicately colored varieties can be placed in light shade to keep the flowers from fading; deep shade should be avoided. Soils of poor fertility which dry out excessively in the summer months are not suitable as they produce plants which grow weakly and flower sparsely. Even in better soils Peonies should be watered freely during periods of drought.

Larger flowers can be produced if the lateral buds are removed early, but care must be taken not to injure the terminal bud. Peony flowers come in a number of types as well as colors. The Doubles last longest, the stamens and sometimes the carpels being petaloid so that a fully double flower results. The Singles (Chinese type) have one or several rows of petals which surround a center of numerous yellow stamens. This simpler type may be preferred by those who find the Doubles to be a bit flamboyant. The Japanese type and the Anemones are often lumped together in catalogs. The former has five or more quite large petals which surround a center of stamens which bear abortive

anthers devoid of pollen, while in the latter, the filaments of the stamens are transformed into narrow, incurved, petal-like structures.

So many varieties are available from specialist nurserymen that only a few of the better ones can be included here. The Doubles include: *P. 'Festiva Maxima'* and *P. 'Le Cygne'* — white; *P. 'Karl Rosenfeld'* and *P. 'Lowell Thomas'* — red; *P. 'La France'* and *P. 'Albert Crousse'* — pink; and *P. 'Clair de Lune'* — yellow. The Singles include: *P. 'Pico'* and *P. 'Cygnet'* — white; *P. 'Champlain'* — pink. The Japanese and Anemone types include: *P. 'Nippon Brilliant'* and *P. 'Mikado'* — red; *P. 'Fuji-no-mine'* — white; and *P. 'Ama-no-sode'* and *P. 'Alstead'* — pink.

New varieties are coming onto the market all the time, and people interested in this group would do well to join the American Peony Society.

Papaver — Oriental Poppy

Oriental Poppies can now be obtained in such a beautiful array of colors that it is unfortunate so many people still associate this group with the old orange-scarlet types. Cultivars with large flowers, six to twelve inches across, which range in color from white to pink, red, and near yellow deserve consideration today. Of these, the white varieties should probably be avoided as they tend to be rather short-lived, and the flowers often become grey from their own pollen. The so-called yellows are basically orange with only a faintly yellow tinge. The better varieties in shades of pink and red include: *P. 'Bonfire'* — bright orange-red, the petals with a crinkled edge; *P. 'Cavalier'* — an excellent deep red; *P. 'Cheerio'* — coral-pink with red at the base of the petals; *P. 'Crimson Pompon'* — deep red, fully double; *P. 'Doubloon'* — orange, fully double; *P. 'G. I. Joe'* — cerise overlaid with watermelon-red; *P. 'Helen Elizabeth'* — probably the best of the pinks; *P. 'Salome'* — rose; and *P. 'Spotless'* — pastel pink without a black blotch at the base of the petals.

Oriental Poppies are good subjects for low maintenance gardening as they can be left for five years and often much longer before division will be necessary. This should only be done for rejuvenation purposes if the clumps start to degenerate. The roots are fleshy, and well-drained soils are essential. Plants seem to succeed equally well in full sun or partial shade and Autumn (August and September) is the time when divisions should be made. The foliage of Oriental Poppies disappears during the summer leaving large gaps in the border. In the author's garden,

clumps of poppies were planted among a ground cover of Vinca by previous occupants of the house, an interesting solution to the problem. Another solution would be to plant annuals which could take over when the poppies die down.

Phlox — Phlox

Phlox paniculata, the tall summer blooming species, should not be attempted in the low maintenance garden. Considerable effort is necessary to keep plants free of mildew, rust, or red spiders. Spraying every ten to fourteen days during the summer with a fungicide or miticide is almost a necessity and plants must be divided every third or possibly fourth year if the clumps are not to deteriorate. Modern cultivars are available in a range of very attractive colors, but the faded flower heads must be removed to ensure a succession of bloom, and if seeding occurs the resultant plants will have flowers of the common magenta color.

Although numerous other species are in cultivation, many require frequent divisions. One of the best is *P. stolonifera*. This can be a good ground cover in the shade, but only where it will have room to spread. Two cultivars are *P.* 'Blue Ridge' and *P.* 'Lavender Lady.' *P. subulata*, the Moss Pink, will form a good ground cover in a sunny position if the soil is well drained. It can also be used as edging on dry walls. Mr. J. Herbert Alexander of Middleboro, Mass., deserves great credit for introducing a number of cultivars which are hybrids between *P. subulata* and *P. nivalis*. Some of the better varieties available from nurseries include *P.* 'Alexander's Beauty,' *P.* 'Alexander's Surprise,' and *P.* 'Emerald Cushion' which are pink. *P.* 'Blue Hills' and *P.* 'Sky Blue' are violet, and *P.* 'Scarlet Flame' is red.

Physostegia — False Dragonhead, Obedience Plant

One could almost forgive this group for their invasive habits, were it not for the fact that they also require almost annual division to maintain any semblance of neatness. As they grow with relative indifference to wet or dry conditions and will tolerate sun or partial shade, they may be of value for naturalizing in a semi-wild area, but should only appear in herbaceous borders when time can be devoted to their upkeep.

Physostegia virginiana has rosy lilac flowers, but there are several cultivars which are more attractive where color is concerned. *Physostegia* 'Vivid,' aptly named, is only eighteen to twenty-four inches high and has deep rosy-pink flowers. Unfortunately this beautiful low-growing variety is as invasive as

the rest. *Physostegia* 'Grandiflora' has bright pink flowers on five-foot stems. A hybrid between the two has been named *P.* 'Rosy Spire,' with rose-pink flowers in early September on three-and-a-half-foot spikes. The one cultivar with white flowers, *P.* 'Summer Snow,' blooms in August, somewhat earlier than the others.

The common names for *Physostegia* are of some interest. False Dragonhead refers to the one-time confusion between this genus and *Dracocephalum* (Dragonhead). Obedience plant or Stay-in-Place, refers to the fact that individual flowers can be twisted on the stem and will remain at whatever angle they are placed, a characteristic which fascinates children.

Platycodon — Balloon Flower

Platycodon grandiflorum is the only species, but there are a few varieties and several cultivars, all of which can be easily grown and last for many years in a single spot. *P. grandiflorum* grows to a height of nearly three feet and produces numerous two- to three-inch bell-shaped blue flowers from late June to early September. There are also pink-flowered and white-flowered forms. In low maintenance situations, *P. grandiflorum* var. *mariesii* which has blue or white flowers may be better. This does not exceed eighteen inches in height and never requires the staking which is often necessary for *P. grandiflorum*. *P.* 'Apo-yama' is a true dwarf with large, violet-blue flowers on very low six-inch stems.

The roots of Balloon Flowers are thick and fleshy and cannot tolerate wet ground. A light, well-drained soil of moderate fertility suits them best, and although the pink varieties will fade unless planted in partial shade, full sun is perhaps best for the blue-flowered or white-flowered types. New plants are of rather slow growth, but well-established clumps may be expected to thrive for twenty years and longer if they are not disturbed.

Sedum — Stonecrop

Many of the species in this group are of interest to the low maintenance gardener, but only a few are subjects for the border, the majority being suited more for the rock garden or as ground covers in sandy, gravelly soil. One which should have a home in every herbaceous border, however, is the nearly indestructible *S. spectabile*, the Showy Stonecrop. This forms a neat, compact mound about eighteen inches high, and produces numerous flowers in large cymes three to four inches across from August until frost. Plants will grow in most ordinary soils

provided drainage is good, and although they will tolerate light shade, a sunny position is desirable.

As with many other groups, the nurserymen have been busy making selections, and there are a number of desirable color forms to choose from: *S.* 'Brilliant' perhaps the leading variety, flowers are raspberry-carmine; *S.* 'Carmen' — carmine-rose to red; *S.* 'Indian Chief' — the pink flowers take on a copper tone during the cooler days of autumn; *S.* 'Meteor' — wine red; *S.* 'Star Dust' — ivory white flowers on blue-green foliage.

Thalictrum — Meadow Rue

The delicate compound foliage and lacy flowers of the Meadow Rues can be used to impart a light airy feeling in the border, and particularly to tone down the heavy effect of a shrubbery. The flowers, which have no petals, are comprised of petaloid, sepals and numerous colored stamens. This somewhat unusual situation seldom fails to attract attention.

Most species are well adapted to tolerate shady conditions, but are often grown in full sun in the border if soil conditions are relatively moist. The taller growing species have sturdy stems, so staking is seldom required. Established plants should last in good condition for a number of years, and it is best to leave them alone until the clumps begin to deteriorate and need to be divided.

T. aquilegifolium grows three feet tall and flowers profusely from late May through June. The flowers are lilac-purple, but there are also white and rose forms. *T. dipterocarpum* was discovered by E. H. Wilson in Yunnan Province, China, and until relatively recently was considered the finest of all *Thalictrums*. It grows up to five feet tall and the flowers appear in panicles with violet-tinted sepals, cream filaments, and yellow anthers in August. There is a white form, *T.* 'Album' and also a double one, *T.* 'Hewitt's Double.'

T. rocheburnianum is decidedly the most outstanding of the whole group and probably one of the finest of all herbaceous perennials. It is now being offered by a few nurseries in the Boston area, and as it becomes better known it will undoubtedly become quite popular. This species is hardier than *T. dipterocarpum* and produces sturdy stems four to six feet tall with large masses of lavender-violet flowers with primrose-yellow stamens. The plant is in blossom from mid-July until early September.

Thermopsis — False Lupine

This is another plant which falls into the relatively small

group of perennials which have the ability to survive considerable neglect yet thrive for many years. They are extremely hardy, never invasive, have no insect or disease problems, and the compound leaves remain in good condition throughout the growing season. The one disadvantage of the most commonly grown species, *T. caroliniana*, is that there may be a tendency for the stems to droop, and where this happens, staking may be necessary. All False Lupines do best in full sun, but will tolerate some light shade.

T. caroliniana is the tallest species. Stems are up to 4 feet tall and are topped by twelve-inch spikes of yellow pea-like flowers in June and early July. Although native to portions of the south-east United States, it is hardy enough to endure the most rugged of New England winters. *T. montana*, a native of the western Rocky Mountains is a smaller plant, to two-and-a-half feet, and of value where space may be restricted.

Tradescantia — Spiderwort

Our native Spiderwort, *Tradescantia virginiana*, has yielded a number of color forms which are well worth growing if neatness is not one of the prime considerations when selecting plants for the garden. In the more tidy formal borders, these plants must be divided regularly if they are not to become straggly. They seem to go best in gardens that have a semi-wild appearance and will also do well near the foundations of buildings, often a difficult place for plants to grow. If one has poor, unfertile soil conditions to deal with, *T. virginiana* and its various cultivated varieties might be considered.

The following cultivars are a good indication of the range of colors obtainable in this group: *T.* 'Blue Stone' — deep blue; *T.* 'Iris Prichard' — white with a flush of blue; *T.* 'J. C. Weguelin' — pale blue; *T.* 'Purple Dome' — vivid rosy purple; *T.* 'Red Cloud' — rosy red; and *T.* 'Snowcap' — pure white.

ROBERT S. HEBB

Appendix I

Perennials to Avoid in the Low Maintenance Garden

Plants on this list require division every few years, those marked with an asterisk may require it annually under most conditions:

Achillea ptarmica vars.
(especially *A.* 'The Pearl')
Arabis

Helianthus
Heuchera
Lychnis

* <i>Aster novae-angliae</i> vars.	<i>Lysimachia</i>
* <i>Aster novi-belgii</i> vars.	(some spp.)
<i>Astilbe</i>	<i>Monarda</i>
<i>Campanula</i>	<i>Phlox</i>
<i>Cerastium</i>	<i>Physostegia</i>
<i>Chrysanthemum maximum</i>	<i>Polemonium</i>
* <i>Chrysanthemum morifolium</i> vars.	<i>Pulmonaria</i>
<i>Doronicum</i>	<i>Solidago</i>
<i>Eupatorium coelestinum</i>	<i>Stokesia</i>
<i>Gaillardia</i>	<i>Tradescantia</i>
<i>Helenium</i>	<i>Veronica</i>

Plants on the following list will become invasive under most conditions and considerable time must be spent keeping them under control. Some of them have value as ground cover, but not in the low maintenance perennial border:

<i>Ajuga reptans</i> vars.	<i>Lysimachia nummularia</i>
<i>Cerastium tomentosum</i>	<i>Macleaya cordata</i> (under
<i>Coronella varia</i> (Crown Vetch)	some conditions)
<i>Helianthus</i> spp. & vars.	<i>Monarda didyma</i> vars.
	<i>Papaver orientale</i>
	(some vars.)
	<i>Physostegia virginiana</i>

Appendix II

Perennials which do not require frequent division, those marked with an asterisk resent disturbance:

<i>Aconitum</i>	<i>Geranium</i> (some spp.)
<i>Amsonia</i>	* <i>Gypsophila</i>
<i>Anemone</i>	<i>Hosta</i>
<i>Armeria</i>	<i>Kniphofia</i>
* <i>Asclepias</i>	<i>Liatris</i>
<i>Baptisia</i>	* <i>Limonium</i>
<i>Bergenia</i>	* <i>Lupinus</i>
<i>Caltha</i>	<i>Lythrum</i>
<i>Cimicifuga</i>	* <i>Mertensia</i>
<i>Clematis</i>	* <i>Paeonia</i>
<i>Convallaria</i>	* <i>Papaver</i>
<i>Dicentra</i>	* <i>Platycodon</i>
* <i>Dictamnus</i>	<i>Sedum</i>
<i>Echinops</i>	<i>Thalictrum</i>
* <i>Eryngium</i>	<i>Thermopsis</i>
<i>Euphorbia</i>	

Correction

Through error the plant that was registered as *Malus* 'Prince Charming' was referred to as *Malus* 'Pink Charming' on page 258 of the November, 1970, *Arnoldia*. We take this opportunity of stating that the correct name is *Malus* 'Prince Charming.'

Arnoldia Reviews

Early American Gardens "For Meate or Medicine," by Ann Leighton

Our knowledge of our Colonial heritage is curiously biased. We know much of politics and colonial dignitaries, of the movements of troops and of taxation, but singularly little of the way of life that our forebears endured. In particular, we are aware of few plants and crops raised by those who settled these shores.

And yet, much is recorded. Part of the problem lies in the fact that the North American Colonies produced no indigenous books on agriculture before 1710 (*The Husbandman's Guide*, Boston: John Allen, for Eleazar Phillips) and the first writing on horticulture seems to be a 'Gardener's Kalender' in Tobler's Almanack for 1752, printed in South Carolina. The first separate work on Horticulture seems to be Robert Squibb's "The Gardener's Kalender for South Carolina and North Carolina" published in 1787 in Charleston.

The historian has to rely upon letters, advertisements and reports, some now republished, but frequently found in collections of historical documents not easily discovered by the horticultural historian. Withal, much has been done. L. H. Bailey has provided extensive data in the *Cyclopedia of American Horticulture*. "Sturtevant's Notes on Edible Plants" edited by U. P. Hedrich and published by the New York Agricultural Experiment Station in 1919 is a mine of information and reference.

Ann Leighton has attempted to give us an idea of what Colonial gardens were like, and what they had in them. Her book is full of curious information. A little more than half the book is taken with discussion of garden design, horticultural authorities, and early New England gardeners and their plants. The balance of the book is an alphabetical listing of the plants known to be grown in colonial gardens, accompanied by appropriate "quotes" from Gerard, Parkinson, and Culpepper.

"For Meate or Medicine" is a masterful beginning. There is

much more to be learned, more sources to be explored, more plants to be grown, and, no doubt, more books to be written.

G. P. DEW. JR.

Ann Leighton, *Early American Gardens "For Meate or Medicine,"* Boston, Mass.: Houghton Mifflin Company, 1970. 441 pages. \$10.00.

Gardens, Plants and Man, by Carleton B. Lees

At first glance this appears to be another coffee-table book, a picture book to be examined once and laid aside. But after an introduction of delightful colored photographs of meadows and flower closeups, of tree bark and bare branches against the sky, one comes upon a series of chapters about the history of gardens.

There is a brief description of gardens of the ancient world, Egyptian gardens, Roman gardens seen through the eyes of Pliny in the first hundred years of this millenium, Moorish gardens, and medieval gardens. There are photographs, and reproductions of drawings and plans from old books.

The scene then turns to early Italian Renaissance, with the gardens of Villa Farnese at Caprarola, the Villa Lante at Bagnaia, and the Villa d'Este, Tivoli. With original garden plans and his own photographs the author tells the story of these three gardens. The chapters which follow tell, in the same manner, the history of a few of the leading gardens of France and England: Vaux-le-Vicomte, Versailles, Hampton Court, Stowe, and others. The last of the series, on United States, deals primarily with modern gardens.

It is an interesting account of the history of gardens, perhaps because it is a personal one. These are photographs taken by Carleton Lees, of gardens he knows.

There follow more pages of pictures, some showing gardens just discussed, some featuring close-ups of flowers and leaves; and the reader then arrives at another series of chapters telling of the men who, since early times, have had an important role in the development of botany and gardens. The list, of course, is not complete. No two writers, having to choose from among many famous names, would agree upon the same ones. But Theophrastus is there, and Fuchs; Parkinson, Kaempfer, Linnaeus and John Bartram; Andre Le Notre, a landscape architect

of the 1600's is there, and Redoute, a botanical illustrator, and many more. Although the list is arbitrary it is an interesting one, and the author has something to say about each.

Some might wish that this volume contained fewer irrelevant photographs, beautiful though they may be, and instead dealt with the subjects more completely, and it is unfortunate that no list of books for further reading is included. The old books listed in the text are not usually available in public libraries, and the sampling in this book surely will whet the appetite of many readers for more. But for the gardener who strives for beauty in his small backyard, for the armchair gardener, and for the would-be traveler this is a book which will surely open new worlds.

H. R. G.

Carlton B. Lees, *Gardens Plants and Man*, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970. 251 pages. \$19.95.

Right: Paeonia suffruticosa. Moutan Peony or Tree Peony. The Tree Peonies bloom in the Arboretum in late May. They have solitary, single or double flowers of white, pink, red or purple from 6 to 12 inches in diameter borne on plants 4 to 5 ft. high. Cultivated for centuries in China and Japan they have only recently become popular in America. Photo: P. Bruns.

Page 144: Prunus subhirtella 'Pendula' in the Arnold Arboretum. Photo: P. Bruns.

Inside back cover: The Arnold Arboretum Lilac Collection in 1915. Photo: T. E. Marr.







ARNOLDIA *is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Massachusetts, U.S.A.*

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ARNOLDIA

The Arnold Arboretum / Vol. 31, No. 4 / July, 1971



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ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Mass. 02130

*Published six times a year: on the 15th of January,
March, May, July, September, and November*
Subscriptions: \$3.50 per year. Single copies, 60 cents
Second-Class Postage Paid
at Boston, Mass.

*On the cover: New England Dooryard, probably a Massa-
chusetts scene, 1849. Oil on Canvas, Samuel L. Gerry,
Artist. Courtesy of Old Sturbridge Village, Sturbridge, Mass.*

COLONIAL GARDENS

I *The Design of Colonial Gardens*

Landscape architects and horticulturists usually extend the colonial period 64 years to 1840. By including the years from 1620 to 1840 we can tell a more complete story even though the period isn't historically correct.

There are several reasons for this. Garden design changed little until about mid-point in the Greek Revival (12) period. Then there was great change with the advent of Victorian architecture and styles.

One reason for such gradual evolution may have been the limited number of books published on the subject. Most of those available until after the Revolutionary War came from England or France. Few were published in the colonies. Similarly, there were few nurseries and seed houses until after the Revolution (17). Another reason may have been the pre-occupation with protest against restrictive arts and with independence.

Actually gardens changed very little during this period even in Europe. Except for the development of the so-called "natural style" in the 1700's, garden design deviated very little from the Tudor style even in England (5). By extending the colonial period to 1840, we are able to include the effects of the "natural style" on the development of American gardens.

The Gardens of Early Plymouth Plantation and Rural New England

The gardens of the pilgrims were purely a functional outgrowth of their needs. The house and barn formed the focus and the site was divided into pens and barnyards near the barn, and the garden was placed near the house. The orchard and fields were planted where soil and exposure seemed best but not always near the "homelot". The plot was studded with sheds, hayracks, coops, and other necessary appurtenances (20).

The size of garden was proportionate to that of the family. Most of the vegetables needed on a small scale were grown in the fenced-in garden near the house. These included leeks, onions, garlic, melons, English gourds, radishes, carrots, cabbages and artichokes. A variety of herbs were grown among the vegetables, the most aromatic grown to one side so as not to "flavor the soil" (20). Vegetables needed in large quantities like maize, beans, and pumpkins were grown in fields.

The herbs were used in cooking, medicines, and for fragrance. A popular dish was a variety of vegetables in a pot stewed with meat and herbs. Herbs for medicine were harvested and dried for later use. The herbs for fragrance were hung in rooms, sprinkled among linens and clothing, or carried in a pocket (20).

Flowers were grown, too; some just to look at, but most for utilitarian purposes. Rose petals, for example, were dried for fragrance. If the lady of the house liked flowers, she often collected violets and mayflowers from the woods and transplanted them into her garden, for it was she who tended them. Otherwise, only those flowers needed for food, medicine, fragrance or dyes were grown.

There was no garden plan as such. In other words, no conscious effort was made to plan a garden in today's sense. The house and outbuildings were sited according to the topography, exposure, and needed relationship. Areas related to them were fenced or penned, and walkways through the gardens were laid down as direct routes from doorway to outbuilding or as seemed best for tending the plants.

The plants were planted in no particular order. Tall plants obscured short plants, flowers were mixed with vegetables, and among them all were herbs. Some of the vegetables may have been planted in blocks according to the European practice of the time. The beds were often raised by building up the soil and holding it in place by saplings laid on the ground. Great emphasis was placed on drainage.

The walks were usually tamped soil, sometimes gravel and occasionally they were surfaced with crushed clam shells. These walks were just wide enough so a person could walk through the garden or weed one of the beds from it. The main walkway leading to an outbuilding may have been wider.

The walk and bed pattern was not necessarily symmetrical or regularly patterned as in the parterre gardens of the merchants in Boston. Instead, an irregular walk pattern was often the case and the beds varied in size and shape according to what was

grown in them and how they fit between the functional walks (1, 9, 10, 16).

The gardens of the Dutch in New York, on the other hand, were often laid out on a highly symmetrical plan with perfectly balanced beds on either side of a central walkway with a series of balanced secondary walks throughout (21).

The Plymouth-type arrangement prevailed throughout the colonial period and well into the 19th century in agrarian New England (20). Numerous old farms laid out in the later part of the 17th century and during the 18th century reflect this scheme with little variation.

Figure 1 shows one such plan on the Nehemiah Williams Farm in Stonington, Connecticut. This farm was recently sold after having been in the same family, handed down from father to son for nine generations. The plan remained essentially the same throughout that period. Notice how the buildings were sited to the northwest of the house to protect it from the prevailing winter winds. The orchard was so located to perform a similar function and to be handy to the house and sheds.

The gardens were not in one large block as we plant them today. The south garden, which is on a three to five percent slope was so placed to capture the warmth of the spring sun for early crops like peas, lettuce, radishes, carrots, beets, and onions. The bean garden did not have a southern exposure but it was protected by two walls, out of the path of the northwest winds, so that the soil would warm up in time for bean planting which was later than lettuce and peas. This garden later became a flower garden.

The two gardens in the front lot were for later vegetables and second plantings of some of the early ones. Also fruits such as strawberries, currants, gooseberries and rhubarb were grown in the front lot garden next to the wall.

Flowers were grown in the dooryard garden to the front, or south of the house. This garden was in full view of the two front parlors or chambers, and people approaching these rooms on special occasions would have passed through them (7). Dooryard or parlor gardens were very popular in the 17th and 18th centuries, reaching the height of popularity after the Revolution.

Dooryard gardens were usually enclosed with wooden fences. These fences often started at the corners of the house and came straight forward. In the case of the Williams garden, the fence went to the stone wall. Where a similar house was close to the street, the fence would have gone to its edge.

NORTH PASTURE

HILL PASTURE

ORCHARD

BARN LOT - CROPS & HAY

BARNYARD

DOORYARD

BEANS

V. GARDEN

FLOWERS

V. GARDEN

SO. GARDEN

PEN

VEG. GARDEN

FRONT LOT - HAY

ROAD

LANE

- 1 - HOUSE
- 2 - BARN
- 3 - STORE ROOM - FORGE - SHED
- 4 - ICE HOUSE
- 5 - CORN CRIB
- 6 - WOOD SHED
- 7 - PRIVY
- 8 - SHOP

NEHEMIAH WILLIAMS FARMSTEAD - 1719

STONINGTON - CONN.

APPROXIMATE SCALE : 1" = 100' 0"



DRAWN FROM AERIAL PHOTO
BY AUTHOR

This plan persisted well into the 19th century as Figure 1 and the cover indicate.

The Gardens of Merchants and Townsmen

In contrast, the merchants who lived in Boston, New York, Philadelphia or most other colonial cities and towns had gardens quite different from those of their brothers in the country. Their gardens were formal, laid out in a symmetrical pattern with each side of a central walkway reflecting the other. These gardens imitated the formal parterre with which many of the merchants were familiar in their homelands (16, 22).

During the colonial era, great emphasis was placed on siting the house on a high piece of ground (15, 18). Sometimes the foundation was purposely built high and the soil dug from the cellar was mounded around it to form a terrace or a series of them. Occasionally, additional soil was brought in to complete a particular terrace plan, but this was not often done. In fact, it is a characteristic of building in the colonial era to search for just the right, natural site for the house rather than to change the topography as we so often do today (15, 23).

The garden was placed near the house. "Have the garden near the dwelling house because such Beauty and Ornament, the more they are under constant Inspection, the easier and better they entertain those two finer senses, Seeing and Smelling" (15, 18). Some writers of the time suggested an eastern or western slope for the garden in an attempt to benefit from the heat generated from the rays of the sun. Many suggested avoiding a southern slope because the sun would be too hot and the plants would "hang their Heads, to wither away, and die" (15). Other authors of garden books suggested a southern exposure to gain maximum benefit from the sun's rays (4).

Actually, we find that in northern climates gardens were often sited on a southerly slope, especially vegetable gardens for early crops. Flower gardens were ideally placed on level spots because it wasn't as important to force perennials into bloom and the annuals couldn't be planted until late in the spring. In other latitudes we find gardens at all exposures depending on the site and philosophy of the owner.

Fig. 1: *This actual plot plan shows a typical layout commonly used throughout New England in the 17th and 18th centuries. In fact, similar plans were used well into the 19th century. The walls and buildings were drawn by the author from aerial photographs supplied by the Tax Assessor's Office, Stonington, Connecticut.*



Fig. 2: — A typical, rural plan showing the layout based on functional needs. Pen and ink, probably Massachusetts or Connecticut, artist unknown — 1840. Photo: courtesy of Old Sturbridge Village, Sturbridge, Massachusetts.

The gardens were usually enclosed. Rarely do we find records of a garden without a fence, wall, or hedge around it. These enclosures were not only to lend privacy to the garden but also to protect it from the winds (15).

Walls were not used as extensively in America as they were in England, Holland and other European countries. Certainly they were important in some cities, especially in the south of New England (22, 26). But except for a few, it seems that most of the gardens in New England were enclosed by wooden fences or hedges (22). Perhaps they were heeding the advice of John Lawrence who wrote in 1776 that the sun and the wind were the worst enemies of plants and gardens. "Walls are some defense, where they are tall and the garden little; but otherwise they occasion great Reverberations, Whilles, and Currents of wind, so they often do more harm than good. I should therefore choose to have the Flower Garden encompassed [sic] by hedges . . . which after frequent clipping are not only more ornamental than the best of walls, but by far more useful, and better defences against the merciless Rage we are speaking of, both with Respect to the Flowers themselves or the female Lovers" (15).

In many communities we find early ordinances regulating the height of fences. Mostly, a higher fence was allowed along the sides and back of the property with a lower one specified for across the front. The style and architecture of the fences were endless ranging from the homely picket fence to a solid board fence with a slatted, louvered or latticed top (16).

The garden plan within the enclosure was a variation on a basic theme. It consisted of a central walk usually on axis with a door of the house (16, 18). Secondary walks radiated from the central walk, sometimes at right angles and other times at acute angles. The central walk was terminated by some sort of feature and often some of the secondary walks were also (See Figure 3).

These terminal features might have been one or many. Summerhouses, arbors, specimen plants and gates were quite common while statues, sundials and steps were also popular (13, 16). Sometimes the focus was merely an opening in a fence, wall or hedge, framing a spectacular or pastoral vista (5).

The length of the garden, its central walk and the complexity of the secondary walks was directly proportional to the extent of financial resources of the owner and his love of gardening.

On either side of the central walk and between the secondary paths were the flower or garden beds. Some were square, others

were rectangular, triangular, or round, depending on the design of the secondary walk system. It was not at all unusual to find all of these forms within one garden, especially if it was a large one (3, 7, 9, 10, 15, 16). The form would "vary according to a Person's different Fancies; yet ought to throw the whole into Variety within Uniformity . . . but care must be taken to contrive it so that it may be easily seen, that the curious Artist may find Admittance to the Beds in every Part, either by the large or by lesser Gravel Walks or Paths; so as by the reach of the Arm every Operation may be performed with Ease" (15).

Oftentimes the wide central walk had one round bed in the center "filled with some curious Ever-green plant cut pyramidically or fluted" (15). Sometimes there were a series of circular, triangular, square or rectangular beds down a very wide central walk.

Around the outside of the garden and just inside the enclosure there was often a large bed or border encircling the entire garden. One description of an early garden (2) states that there were eight square beds in the center with two wide borders running along the fence, all tied together by a series of gravel walks between beds "raised by boards."

This typical pattern, used almost without exception, was imposed on every type of site, regardless of the topography. There are numerous descriptions, drawings, and plans of colonial gardens where the central axis walk plan was imposed on a sloping site (6, 24, 26, 27). Most of the gardens on old Pemberton Hill in Boston had this arrangement going up hill from the house, and the beds were on a series of terraces (24). Philadelphia had its classic examples, and one of the best garden examples using this arrangement is on the grounds of the Moffatt-Ladd House in Portsmouth, New Hampshire. This garden was restored according to an old record made by the Ladds who came to the house in 1819. It is unique for the set of grass steps which (combined with an arbor as background) is the focus for the central path (6).

The arrangement of plants within the garden varied with the whim of the owner. Sometimes the gardens we have described were devoted entirely to flowers. Others combined herbs with flowers. "In our garden, according to custom of the time, four beds (of eight) were given to herbs useful in cooking or for household remedies" (3). Some of the beds were even given over to vegetables, depending on whether or not the owner had a special kitchen or vegetable garden elsewhere on the property (7).

Fruit trees were often found in the garden and trees in general were included. Shrubs and roses were placed in the border beds that encircled the garden (3), but sometimes they were placed in the beds themselves as shown in Figure 3.

There was no special massing of flowers and herbs for effect. "In those days a garden was not usually arranged for the effect as a whole . . . each plant was cherished for itself, and was put where it seemed best for it individually, or often, of course, where it was most convenient . . . four corners of one bed were filled with fleur-de-lis (iris) white and blue . . . and the corners of another with Sweet Williams" (3). The taller flowers were often planted in the borders around the outside, but sometimes they were planted in the center of the beds with shorter plants surrounding them.

The massing of plants and the repetition of these masses to give continuity of design was not a 17th and 18th century principle of garden planning. Gardens during that period were tied together by the system of walks, beds edged with boxwood, ribbon grass, moss pink (3), pinks (*Dianthus*), lavender (*Santolina*) and germander, or by the enclosure around the whole garden.

Today some think of the colonial garden plan as being intricate and involved for no real purpose, but as we study it we find that it was an outgrowth of the times. The involved walk system was laid down to divide tall flowers from short flowers, culinary herbs from flowers, and medicinal herbs from vegetables. These walks made the beds accessible for cultivation, admiration and harvesting. And, they felt, why not arrange the walks and beds in an interesting pattern if you have to have them? Then the whole had to be fenced for protection against the unwanted glances, wind and roving animals. What a good place to grow tall plants — the fence gave them background and support if needed and the plants softened the high, harsh fence or wall. A perfect solution for the times!

Fig. 5: This reproduction of a 1792 painting of Mount Vernon shows the planting of trees on either side of the approach avenues and the Mansion. Note also the design of the courtyard immediately in front of the Mansion. Photo: courtesy of the Mount Vernon Ladies Association of the Union, Mount Vernon, Virginia.

Fig. 6: This companion 1792 painting of Mount Vernon, East Front shows the barely visible forms of deer (foreground) and the fence built to confine them. Photo: courtesy of the Mount Vernon Ladies Association of the Union, Mount Vernon, Virginia.



What about herb gardens? Some twentieth century gardeners think of colonial gardens only in terms of herbs, probably because herbs are so popular in culinary art today and we are generally familiar with them. But, during the colonial period, unless one was engaged in the growing of herbs for sale, as the Shakers (1) and some others were, most people did not have a garden set aside especially for them. These plants, as previously mentioned, were grown among the flowers and vegetables or in a portion of the kitchen garden (7, 16, 20).

Country Estates on the Outskirts of Town

The gardens described were laid out on the smaller, tighter sites along the streets of cities and towns. This does not imply that all city lots were small for some were of several acres (26). But they were often narrow and the parterre plan lent itself well to this shape of lot. Even people of limited financial resources used a similar but small version of either the Plymouth type or (more often) the parterre type of garden plan (23).

In the early 18th century, Joseph Addison, Alexander Pope, and Sir Richard Steele wrote satire about the rigid, formal garden filled with topiary and enclosed by a wall. Addison revised his own planting to "run into as great a wilderness as their natures will permit" (25). Bridgeman, a leading landscape architect of the period, was greatly influenced by their satire, banishing sculpture and elaborate design in favor of bits of woodland in the landscape (10). William Kent emerged to fame eliminating walled enclosures and substituting ha-ha walls to separate areas inconspicuously.

This so-called "natural style" was carried to its heights by Lancelot "Capability" Brown and others in the 18th century (14). In fact, Brown's gardens are often characterized as "a round lake, an open lawn, and a copse of trees". This influence was felt in the colonies by the wealthy plantation and estate owners. By the late 1700's, most wealthy properties covering vast acreage, whether in Virginia, Philadelphia, along the Hudson River, or in New England, were designed or "laid out in the natural style".

New England, while not entirely so, was most conservative with this style, probably because the various skills necessary to run the household were housed under one roof because of climate, rather than strung out as they were at Mt. Vernon, Monticello, and in other southern estates. For this reason, an arrangement of buildings pulled close together lent itself better to the formal plan than to the "natural style" (23).

New England was not without its "natural" gardens, however. Numerous estates surrounding Boston, for example, were laid out in this manner (24). And Samuel McIntyre suggested such a plan for the Elias Haskett Derby Mansion in Salem, Massachusetts (16). Theodore Lyman's "Waltham House" purchased in 1795 "arranged the grounds with . . . noble trees, lake, gardens, terraces, lawns and a deer park" (24).

In fact, at least one garden in New England was revamped according to the style of the day. Miss Susan Quincy, in her *Memoirs*, tells how President Quincy changed the plan on the Quincy Estate, "being a great lover of nature. Obstructions to views were removed; walls and fences leveled; lawns with trees and shrubs judiciously disposed, replaced the court-yard and gardens; and the approach to the house turned through an avenue of elms, a third of a mile in length . . ." (24).

Mount Vernon is one of the best authentic examples of an estate that combined both the "natural style" and the parterre plan (See Figure 4). Approaching the Mansion is the Serpentine Avenue encircling the bowling green. Note how the avenue is heavily planted with trees (See also Figure 5). Some of the original trees are still growing along this approach (11).

On either side of the tree-lined avenue and bowling green are the parterred flower and kitchen gardens (6), both the same size and shape, differing only in detailed interior arrangement. Actually, the whole plan approaching the Mansion is symmetrical in design, though informally planted.

Between the Mansion and the Potomac River, however, is a broad expanse of lawn, a ha-ha wall (see upper right of plan in Figure 4) and a copse of trees on the east front of the Mansion (see Figure 6). This illustration shows that George Washington even included a "Deer Park" like so many of the estates in England. Washington wrote in 1792, "I have about a dozen deer (some of which are the common sort) which are no longer confined in the Paddock which was made for them but range in all my woods and often pass my exterior fence" (2). Several early gardens in this country had deer parks, among them the "Waltham House" Estate of Theodore Lyman (24) and the Robinson Estate, built in 1750, and opposite the present West Point Academy on the Hudson River (21). Deer in the landscape made these seats more "natural".

Thomas Jefferson's plan also gets away from the formal, parterre layout, but it, too, is symmetrical immediately in front of the house (see Figures 7 and 8). His plan has an informal walkway which he called the "Round-about" and it was bounded

by flower borders. These have been restored according to his plan (See Figure 8). Near the house are circular beds which were planted in 1807 (19).

The plan for "Solitude", the seat of John Penn in the Philadelphia area, shows an arrangement that would have pleased William Kent and Capability Brown. On this estate were a ha-ha wall, irregular flower gardens, a vista south of the house, and a clump of trees to the east (26).

Along the Hudson River there were many estates (Philipse Manor, Van Cortlandt Manor, and the estates of the Livingstons and the Van Rensselaers, among others) landscaped in the "natural style" and less symmetrical than Mount Vernon, probably because of the more varied topography, but still with the parterre garden near the formal Mansion House (21).

Conclusion

It is safe to say that the gardens of the colonial period were planned according to the way of life of the owners. In rural agricultural areas the gardens were of the Plymouth type, laid out between functional walks and paths, but not rigidly formal in pattern as the parterres of the city merchants, tradesmen, and professionals.

When the influence of the natural style, carried to its height by Capability Brown, reached this continent, the owners of the large estates and plantations were affected by it, but they retained the formal parterre plan for gardens near the house.

On the smaller city sites that did not lend themselves to the development of lakes, copses of trees and expanses of lawns laid out to imitate nature, the rigid parterre plan remained until well into the 19th century.

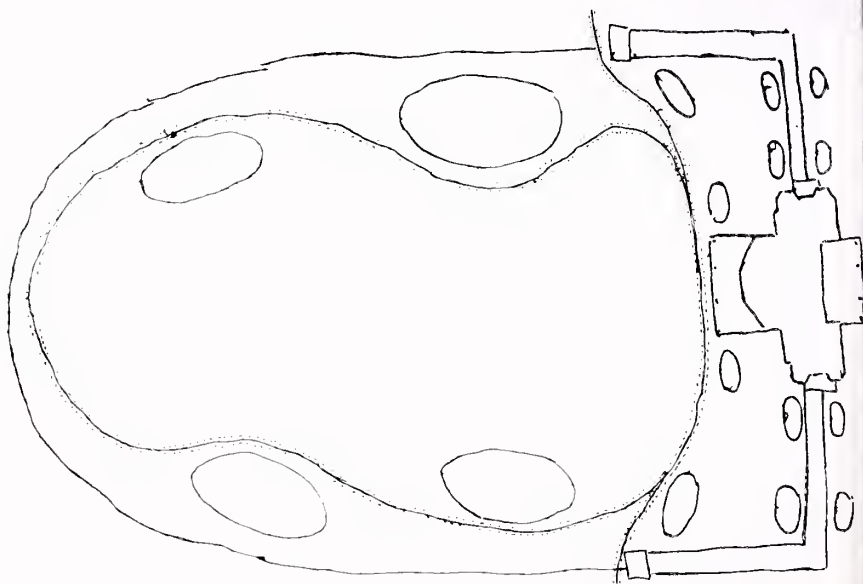




Fig. 8: The restored flower beds and borders at Monticello as they look today. Photo: courtesy of the Thomas Jefferson Memorial Foundation.

Fig. 7: Thomas Jefferson's plan of the "Round-about Walk", flower borders (dotted lines) and beds (circles). The flower beds were laid out and planted in 1807 and the winding walk and flower borders in 1808. Courtesy of the Thomas Jefferson Memorial Foundation.

II How to Create or Restore a Colonial Garden

In historic preservation, the creation or restoration of early gardens should be a subject of major concern. Often the grounds and gardens are overlooked, but fortunately this is becoming less true as we progress through the century.

For many it is hard to know what type of garden plan to use, where to put the garden, how to enclose it, how large it should be, whether to include vegetables and herbs as well as flowers, and how to go about installing the garden generally. It is best to hire professional assistance in the person of a landscape architect who is sympathetic towards the area of historic preservation and restoration. But sometimes funds do not permit this type of consultation and an individual or committee is appointed to develop the plans.

Naturally, the first thing to do is research the site, the people who lived there, and the records. Leave no stones unturned because the more you can find the better and more individualistic the garden will be.

It matters not what area you research first. Let us start with the people who lived in the house: what they did; when they did it; if there were several families, find data on each and determine which one or which period you will represent. An example of this is the research that went into the garden the author designed for the Noah Webster House. Naturally we knew about the famous linguist, but he didn't live there after he became famous. So the obvious question was: what did his parents do? They were farmers, not wealthy, but of moderate means. The architecture of the house was simple, not elegant, further pointing to the fact that the garden should be small and simple and not contain unusual plants such as a vast array of tulips that had to be imported. Instead, the garden should contain plants needed for everyday sustenance.

Sometimes in researching the people who live in a house, you find facts that pertain directly to gardens. The garden at the Salem Towne House at Old Sturbridge Village contains many fruit trees because Mr. Towne experimented with fruit and actually developed a new variety of apple called the "Porter". These details lend interest and individuality to a garden.

Garden of the Standish House at Plimoth Plantation with Pot Marjoram, gold, cabbage, carrots, red kidney beans, watermelons and muskmelons.
Photo: courtesy of Plimoth Plantation.



Written and published records could shed much light on the gardens of a particular site. Probate inventories often mention orchards, walls and gardens, and some have been known to have plans attached. Some probate records name fruit trees by variety. But even if the inventories or wills contain no mention of gardens, they give you an idea of the relative worth of the person. This is invaluable information because it offers guidelines concerning a size for the garden and the elegance of the proposed plan.

Deeds can offer garden information. The author recently came across one deed that mentions "the southwest corner of the garden west of the dwelling house" as the beginning of a boundary. Upon investigating the site, the exact dimensions of the garden were determined with relative ease.

Diaries, journals, letters and personal documents usually contain a wealth of information. One has only to read the diaries of George Washington and Thomas Jefferson to get a clear picture of gardening and agriculture. Lesser known men and women kept records, too, on such facts as when flowers came into bloom, when seeds were planted, and how and when walks were laid. Account books, while they contain only facts and figures, are invaluable because in them are such items as listings of seeds bought, crops harvested, tools purchased, and materials bought to combine with herbs for household remedies.

Personal letters written from husband to wife, sister to sister, brother to brother, reveal much because it was the custom of the day to speak of plants in bloom in the garden, the change of season and its effect on the garden, what was harvested, and much more.

Town histories sometimes have descriptions of a garden or a site, but quite often contain sketches of houses showing their gardens and fences. It was in Caulkins' *History of Norwich, Connecticut* that we learned about some ordinances controlling the height of fences during the colonial period. John Warner Barber wrote "Historical Collections of Every Town . . ." on many states in the early 19th century. His engravings of each town show gardens in some cases, fence styles, street tree arrangements, and many other details.

News articles and advertisements are helpful, especially in developing a list of plants. Many state and local historical societies have collections of early newspapers and broadsides. Articles sometimes appear commemorating a particular individual and sometimes his house and grounds are mentioned.



Old essays, speeches, and pamphlets are invaluable. The archives of horticultural societies are full of this type of information.

The author relies heavily on paintings for information on the design of gardens. These works often suggest a fence style or garden arrangement typical of a particular town or region. We are aware of some murals that show village scenes that can be identified and many of these illustrate gardens.

One is not often lucky enough to find a plan. How many people make a plan today? Not many. The same was true in early times and many of the plans that were made have been lost. But do not overlook this aspect of research; sometimes the files of historical societies contain them. Even if it is not the plan of the site in question, if it is in the same region or area you might get some ideas.

While word of mouth is not considered as reliable a source as the written word, you should consider it. On asking a member of the ninth generation of the Nehemiah Williams family if there ever had been a garden in front of the old house and if there were had it been fenced as most of them had been, he responded in the affirmative. Upon probing the site, we found the stub of a stone fence post that had broken off, proving that there was a fence there.

Probing the site itself often reveals much information. It is good to do this late in the fall when the tall grass has died down or early in the spring before it starts to grow. Then you can see the lay of the land. Sometimes you will find the remains of an old walk, and depressions on either side will suggest that there were beds there. Sometimes there are mounds instead of depressions suggesting that the beds were raised.

Areas enclosed by walls or plants suggest that the enclosure was either a pen or a garden of some sort. One walled enclosure we found, family tradition says, was a children's play yard laid out to confine toddlers so they wouldn't stray into the woods.

An odd arrangement of trees or shrubs, having no meaning today, with careful study might suggest a garden plan. Large shrubs and small trees around the outside of an area with a depressed or raised spot in the central portion most certainly suggests a garden.

Sometimes removing soil from these depressed or raised areas, or from around walls or house foundations will bring plants to life. Many times seeds that haven't been planted in years will germinate because they have been preserved in the depths of the soil. These may not necessarily date to the colonial period, but they might suggest how a present-day garden evolved.

Should There Be a Garden?

Sometimes there were no flower gardens because only vegetable gardens were planted, and flowers and herbs needed for food, fragrance and medicine were grown among them. Maybe there were a few flowers by the front door and some herbs by the kitchen, and that is all. This is where research about the people who occupied a given house may cast light on whether or not there should be a garden and what type.

If you are thinking of a garden for your own home, there are two ways to approach the problem. If you are a purist and want things just as they were then, proceed as suggested. But if you do not really like to garden and cannot afford to hire a gardener, then perhaps just some fruit trees surrounding the property, some shade trees along the road, some lilacs at the corner of the house and near the shed, and some herbs by the back door will suffice, preserving the character of the site and yet not creating a burden on you.

If you have reproduced a site, or even if you have an old one and are not a purist, why not plan as our forefathers did — basing the plan on function: a dooryard garden near the front door to create an interesting entrance space, some trees to provide shade and define the front yard, some herbs by the back door and a little lawn for recreation, with a vegetable garden (if you want one) to the rear. This will satisfy your needs and, after all, that's how they planned in the colonial era.



Examples of Authentic Colonial Gardens in New England

Connecticut

Henry Witfield House (17th century), Guilford
 Welles-Shipman House, Glastonbury
 Isaac Stevens House, Wethersfield
 Joseph Webb House, Wethersfield
 Hatheway House, Suffield
 Tappan Reeves Law Office, Litchfield
 Noah Webster House, West Hartford

Maine

Longfellow House, Portland

Massachusetts

Whipple House, Ipswich
 Pliny Freeman Farm, Old Sturbridge Village, Sturbridge
 Salem Towne House, Old Sturbridge Village, Sturbridge
 Fitch House, Old Sturbridge Village, Sturbridge
 Gardens at Plimoth Plantation, Plymouth
 Mission House, Stockbridge
 Coffin House, Nantucket

New Hampshire

Moffatt-Ladd House, Portsmouth

Rhode Island

The Garden at Shakespear's Head, College Hill, off of
 Benefit Street, Providence
 Governor Stephan Hopkins House, Benefit Street, College
 Hill, Providence
 Smith's Castle, Cocumscussoc, U.S. 1, Wickford
 Varnum Gardens, East Greenwich
 "White Hall", Middletown
 Wanton-Lyman-Hazard House, Broadway Street, Newport

III Authentic Plants for Colonial Garden Design

People interested in colonial buildings and the grounds that surround them are excited to see that so many buildings and sites of this period are being carefully restored. Within recent years, restorers have used greater care in architectural restorations and have furnished buildings in an authentic manner.

Generally, this has not been true concerning the grounds. It is disappointing to see careful restorations ending with the four outer walls and no care given to making the grounds equally authentic. In one sense, this is betraying the viewer who expects a thorough and accurate representation of the period.

There are many carefully restored houses that have foundation plantings surrounding them. These are entirely wrong for they represent the period from about 1850 to post World War II and certainly not the colonial period. Within these plantings one finds Forsythia, not even introduced into England from the Orient until 1844 (27); Japanese Yews, introduced into America from Japan in 1861 (27); Pfizer Juniper, introduced in 1901 (27); Pachysandra, introduced in 1882 (27); and *Spirea vanhouttei*, whose first documented date in America is 1866 (27).

Certainly, the way in which plants are used around structures of the colonial period makes these buildings more authentic, real, and alive.

It is the purpose of this article to present a documented list of authentic plants for the colonial period. Many lists exist but few are documented and it is possible to find errors and misinterpretations that have been perpetuated for over fifty years. Hopefully, this article will eliminate some of these errors.

In discussing the design aspects of the colonial era, we usually deal with the years from 1620 to 1840 (6, 6a) because design did not change drastically during this period. But in considering the plants, many nurseries and seed houses were established after the Revolutionary War (14, 15), and many plants were imported (14); so we define the colonial period in its true, historical sense, 1620 to 1776, recognizing that there was a settlement in Jamestown, Virginia as early as 1607.

Plants in the Colonial Period

Although nurseries and seedhouses were few, research in this

era reveals that there were many plants available. Many of them were brought over from Europe with the settlers, others were sent for (14, 15), and there was a great deal of trading and exchange of slips, cuttings, and seeds from person to person. The statement is often made by individuals and committees in charge of restoring old gardens and grounds that the kinds of plants available were limited. This is not true as the following list shows. Perhaps there were fewer varieties and spectacular colors, but it was still easy to provide a "splash" of color during the summer months.

The most common annuals during the colonial period were Four-O'Clocks in all the colors available today; Balsam, in red, white, purple, blush or pink, singles and doubles; the several *Amaranthus* in the following list; Globe Amaranth, or Gomphrena, in purple or red, and white; Batchelor's Buttons in white, blue, purple and red; and Calendulas in yellow and orange (1).

Of the biennials, Sweet Williams were used extensively, in fact so much so that they divided the shorter and narrower leaved ones into a different common group called "Sweet Johns" (19). Hollyhocks were plentiful, both singles and doubles "in several colors" (17). Believe it or not, two of the most popular garden flowers were Buttercups (Fair-Maids-of-France) (5), and Dandelions (5, 8, 9). From these early gardens, these two flowers, among others, escaped from cultivation into the wild.

Three flowers used little today were very common during this period. Cowslips or Oxslips (Primroses) gave a great deal of color to the gardens of our early settlers and so did the Clove-Gilliflowers, Pinks or Dianthus. Another common inhabitant of the garden was Feverfew or Featherfew. All of these flowers and others are mentioned in the attached list.

Having listed a dozen or so of the most common flowers during the colonial era, how do these compare with what one authority considers the leaders of today? (21)

Petunia — We have found no mention of this flower in the early garden books. Perhaps it was grown in the early gardens but the literature does not identify it as such. The name *Petunia* is a South American aboriginal name said to have been applied to tobacco (3). It is possible that *Petunias* are called tobacco or *Nicotiana* in some of the early books.

Zinnia — These are listed quite frequently in the literature of the late 18th century but not during the early writings. It appears that they were just being introduced around the

turn of the century (1800). Reds and yellows would be appropriate for that period (1).

Marigold — The French Marigold (*Tagetes patula*) was used extensively quite early in the colonial period, but it appears that the African Marigold (*Tagetes erecta*) was not as common until around 1800 or later. The tiny, dwarf varieties that are so commonly used today would not be appropriate in an authentic restoration.

China Aster — Contrary to earlier lists, this plant was used during the colonial period, but it wasn't used as commonly as those flowers listed above. It seems that the most common varieties were single (5).

Sweet Pea — These were probably used throughout the colonial period, but we have not found a reference to them before the 1700's.

Snapdragon — Although these do not appear to have been among the most common annuals, they were used very early and the most popular colors were "red, white, purple, and variable" (1).

Larkspur — These were used very early, but were not called Larkspur until late in the period. Earlier they were called Larks Heels or, rightly so, Delphiniums.

Morning Glory — There seems to have been practically every color imaginable (red, white, purple, dark blue, and striped) (5) with the exception of today's popular "Heavenly Blue".

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Acknowledgements

Without the help of many people, this compilation would not have been possible. Special thanks go to Miss Etta Falkner, Research Librarian, Old Sturbridge Village; Mrs. Fayre Nason, Librarian, Worcester County Horticultural Society; Mrs. Muriel Crossman, Librarian, Massachusetts Horticultural Society; Mr. Abbott Lowell Cummings, Assistant Director of the Society for the Preservation of New England Antiquities; the Boston Athenaeum; and the staff of Mr. John Alden, Keeper of Rare Books, Boston Public Library.

The author's wife, Joy, gave invaluable assistance in the compilation of the lists.



COLONIAL GARDEN PLANTS

I Flowers Before 1700

The following plants are listed according to the names most commonly used during the colonial period. The botanical name follows for accurate identification. The common name was listed first because many of the people using these lists will have access to or be familiar with that name rather than the botanical name.

The botanical names are according to Bailey's *Hortus Second* and *The Standard Cyclopedia of Horticulture* (3, 4). They are not the botanical names used during the colonial period for many of them have changed drastically.

We have been very cautious concerning the interpretation of names to see that accuracy is maintained. By using several references spanning almost two hundred years (1, 3, 32, 35) we were able to interpret accurately the names of certain plants. For example, in the earliest works (32, 35), Lark's Heel is used for Larkspur, also Delphinium. Then in later works the name Larkspur appears with the former in parenthesis. Similarly, the name "Emanies" appears frequently in the earliest books. Finally, one of them (35) lists the name Anemones as a synonym.

Some of the names are amusing: "Issop" for Hyssop, "Pumpions" for Pumpkins, "Mushmillions" for Muskmellons, "Isquouterquashes" for Squashes, "Cowslips" for Primroses, "Daffadown dillies" for Daffodils.

Other names are confusing. Bachelors Button was the name used for *Gomphrena globosa*, not for *Centaurea cyanis* as we use it today. Similarly, in the earliest literature, "Marygold" was used for Calendula. Later we begin to see "Pot Marygold" and "Calendula" for Calendula, and "Marygold" is reserved for Marigolds. The name "Cowslips" for Primroses can be confusing for in some parts of the world that is the name used for "Marsh Marigolds", *Caltha palustris*.

"Winterberry" was a name commonly used for Chinese Lan-

terns (a modern common name), and "Alkekengi" was also used for this plant. But one must be careful in reviewing the literature because *Ilex verticillata* and *Ilex glabra* might also be called Winterberry. "Gilliflowers" is a name used for *Dianthus* and Stock, but there was also an apple by this name.

In parts of Virginia, the name "Ivy" is used in reference to Mountain Laurel, *Kalmia latifolia* (5). Jefferson used the name "Puckoon" to refer to Bloodroot, or *Sanguinaria canadensis* (5). In some parts of Connecticut, the name "Ox-eye Daisy" was and is used for Black-eyed Susan, *Rudbeckia hirta*, but in most places "Ox-eye Daisy" refers to *Chrysanthemum leucanthemum*. In a village within a town in Connecticut, Daylilies (*Hemerocallis fulva*) are called Wash-House Lilies, not Daylilies.

Unfortunately these common names were used freely, perhaps more so than the botanical names, such as they were. For this reason, the "unraveling" of lists in old books and the compilation and documentation of new lists becomes necessary.

Wherever possible we have worked from primary sources. Where these were not available, we have used reliable secondary sources. The numbers in parentheses after each plant refer to the references in the bibliography from which they were derived.

These lists have not been presented as complete and final compilations. We consider that an entire lifetime could be devoted to documenting the plants of the colonial period and then the list would not be complete.

The reader should be aware that most of the early gardeners who kept notes or wrote books were either wealthy or experimenters in the field of horticulture. For this reason, many of the species that seem unusual today were probably unusual then and for that reason should be used with restraint. Also, other plants may not have been used freely. Barberry, which was once commonly grown, was outlawed in Massachusetts in 1754 because it was suspected as an alternate host for wheat rust (2). Furthermore, plants such as *Kalmia latifolia*, Mountain Laurel, were detested by farmers because they were poisonous to livestock (36).

Some readers will be disappointed that varieties of fruits and vegetables are not listed. This was not within the scope of this article. Such listings may be found in numerous books on garden and fruit culture, one early one being *McMahon's Garden Calendar* by Bernard McMahon, published in Philadelphia in 1806. For the period this book had a large printing and is available in most horticultural libraries. The Worcester County Horticultural Society also has a list of available varieties (44) from their experimental orchard.

- Aconitum, Wolfsbane (21, 32, 35) *Aconitum napellus* L.
Native of Germany, France and Switzerland. Cultivated in England in 1596 by Gerarde. Cultivated for its showy blue-purple flowers and the medicinal properties of its poisonous roots.
- Winter Aconite (32) *Eranthus hymalis* (L.) Salisb.
Native of Italy, Silesia, and Switzerland. Cultivated in England in 1596 by Gerarde. Desired for its yellow flowers in early spring.
- Alkekengi, Winterberry (21, 32) *Physalis alkekengi* L.
Native from southern Europe to Japan, but now adventive or naturalized in many parts of the world. Cultivated in England at least by 1597. Originally grown for the fruits which were used medicinally. More recently the fruits with their inflated orange calyces have been used in winter bouquets.
- Amaranthus, Flower Gentle, Joseph's Coat, Tricolor (32, 35) *Amaranthus tricolor* L.
Found throughout the tropics, probably native in Asia. Cultivated by Gerarde in 1596. "The chieftest beauty of this plant consisteth in the leaves and not in the flowers; for they are small tufts growing all along the stalk, . . . every leaf is to be seen parted into green, red, and yellow, very orient and fresh . . ." (31).
- Amaranthus, Great Flower Gentle, Love-Lies-Bleeding (32, 35) *Amaranthus caudatus* L.
Native in the tropics. Cultivated by James Sutherland in 1683. ". . . the flowers stand at the toppes of the stalke and branches more spread at the bottome into sundry parts, the middle being longest, and usually when it is in the perfection hanging down like a tassell . . . of a more excellent scarlet red colour . . ." (33).
- Anemone, Windflower (32), Emanies (35) *Anemone coronaria* L.
Anemone hortensis L.
Native of southern Europe and the Mediterranean region. Cultivated in England in 1596, according to Gerarde, for their showy flowers.
- Armeria, Sweet John, Sweet William (32, 35) *Dianthus barbatus* L.
Native in Europe and Asia, south to the Pyrennees. Cultivated by Gerarde in 1596. ". . . the common Sweet William . . . has long been cultivated in the Gardens for Ornament, of which there are now great Varieties which differ in the Form and Colour of their Flowers, as also in the Size and Shape of their Leaves; those which have narrow Leaves were formerly titled Sweet Johns by the Gardeners, and those with broad Leaves were called Sweet Williams . . ." (30).

Asphodell (21, 32)

Asphodelus albus Miller*Asphodeline luteus* L.

Both are native of the Mediterranean region and were known to Parkinson in 1640 (33).

Aster, Starwort (32)

Aster tradescantii L.*Aster amellus* L.

Aster tradescantii L. is a North American plant cultivated by the younger Tradescant as early as 1656. *Aster amellus* L. is native in southern Europe and Asia. Cultivated by Gerarde in 1596.

Balsam (32, 35)

Impatiens balsamina L.

Native in Southeast Asia. Parkinson grew it by 1629 from seeds sent from Italy, and Gerarde had it in 1596. "... the Japanese use the juice prepared with alum, for dying their nails red . . ." (31). There is also a European species with small flowers which was early confused with our native *Impatiens capensis* Meurburgh.

Bachelor's Button (26).

Gomphrena globosa L.*Centaurea cyanus* L.

According to P. Miller this name was applied to *Gomphrena globosa*. "... by the Inhabitants of America . . ." (30). *Centaurea cyanus* "... is called Bachelor's Buttons in Yorkshire & Derbyshire, but this name is given to many other flowers . . ." (30) as, for example, double flowered forms of *Achillea ptarmica* L.

Beare's Ears (32) — See Primrose

Bellflower (21, 32, 35) the Great *Campanula pyramidalis* L.
Steeple, or Chimney Bellflower.

Native of Southern Europe. Cultivated by Gerarde in 1596. "... This plant is cultivated to adorn Halls and to place before the Chimnies in the Summer . . ." (30).

——Peach-leaved Bellflower *Campanula persicifolia* L.

Native of Eurasia. Cultivated by Gerarde in 1596. "... of this there are the following varieties, viz. the single blue, and white Flower, which have been long here; the double Flower of both Colours, which have not been more than twenty Years in England, but have been propagated in such Plenty, as to have almost banished those with single Flowers from the Gardens. . . ." (30).

——Great Bellflower, Great or *Campanula trachelium* L.
Nettle-leaved Throatwort, Canterbury Bells.

Native in Europe. "... The Varieties of this are, the deep and pale blue; the white with single Flowers, and the same Colours with double Flowers . . . those with single Flowers do not merit a Place in Gardens . . ." (30).

- Creeping Campanula *Campanula rapunculoides* L.
Native in Europe and Asia Minor. Resembling *C. trachelium*.
Cultivated in 1683 by James Southerland. “. . . Sometimes
grown in Gardens, where it speedily becomes a weed” (7).

- Blew Bindweed, Convolvulus (32, 35) *Ipomoea nil* (L.) Roth
Native of the Old World Tropics, but now widely distributed.
There are many forms in cultivation — such as cv. ‘Scarlet
O’Hara’. “. . . It . . . was cultivated before 1596 by Gerarde,
but perished before it ripened its seeds . . . This species is
now rarely met with in our gardens . . .” (31).

- Bloodroot (22) *Sanguinaria canadensis* L.
Native in eastern North America. “. . . Cultivated in Eng-
land in 1680 by Mr. William Walker . . . in St. James Street
not far from St. James Palace . . .” (31). “This strange Cel-
andine hath a fleshie roote, full of a yellow juyce, smelling
strong like the ordinary, from whence rise onely three large
blewish greene leaves, cut in after the manner of Vine leaves,
without any foote stalke under them, or with very short ones,
from among which rise a short reddish foote stalke, with a
white flower on the toppe of it like unto the flower of Sow-
bread. . . .” (33).

- Calendula (22, 32, 35, 40) *Calendula officinalis* L.
Pot Marigold. “. . . Native of France, in the vineyards of
Italy, in the corn fields of Silesia, in orchards, gardens, and
fields; flowering most part of the summer. Parkinson informs us
that he received the seed of the single Marigold from Spain,
where it grows wild, ‘by Guillaum Boel, in his time a very
curious and cunning searcher of simples.’ It was however
cultivated by Gerarde in 1597, and probably much earlier. . . .
It has . . . been cultivated time out of mind in kitchen gardens
for the flowers, which were dried in order to be boiled in broth:
from a fancy that they are comforters of the heart and spirits.
. . . According to the observation of Linnaeus, the flowers are
open from nine in the morning to three in the afternoon. This
regular expansion and closing of the flowers attracted early
notice, and hence this plant acquired the name of *Solsequia*
and *Solis sponsa*. There is an allusion to this property in . . .
Shakespeare —

‘The Marigold, that goes to bed wi’ th’ sun
And with him rises weeping,’

. . . *Golds* or *Gouldes* is a name among the country people not
only for this, but for *Chrysanthemum segatum*, any sort of
Hawkweed, and in short for most yellow flowers of the syngene-
sia class. . . . The varieties are supposed to have been origin-
ally obtained from the seeds of the single sort, but most of
these differences continue, if the seeds are properly saved; but
the two childing [bearing additional small heads around the
base of the main head] Marigolds, and the largest double, are
subject to degenerate, where care is not taken in saving their



seeds. The best way to preserve the varieties, is to pull up all those plants, whose flowers are less double, as soon as they appear, and to save the seeds from the largest and most double flowers; the childing sort should be sown by itself in a separate part of the garden, and the seeds saved from the large centre flowers only, . . ." (31).

Campanula — see Bellflower

Canterbury Bells (32, 35)

In the time of Parkinson (the 1600's) this referred to *Campanula trachelium* L. (see Bellflower). *C. medium* L. which we know as Canterbury Bells was at this time called Coventry Bells. "Doubles" at this time almost surely referred to the double-flowered forms of *C. trachelium*, since double-flowered forms of *C. medium* were not common even in 1800.

Candytuft, Purple Candytuft (21, 35) *Iberis umbellata* L.

Native of southern Europe. This seems to have been the commonly cultivated Candytuft of this period. It was grown by Gerarde in 1596, and was given nearly a page in Parkinson's *Paradisus* . . . (32).

Cardinal Flower (21, 32) *Lobelia cardinalis* L.

Parkinson grew it in 1629. ". . . grows naturally by the Side of Rivers and Ditches in great Part of North America, but has been many Years cultivated in the European Gardens for the great Beauty of its scarlet Flowers . . ." (29).

Centauray (21, 32, 35) *Centaurea centaurium* L.

Native in Spain and Italy. Cultivated by Gerarde in 1596. ". . . stands in the List of medicinal Plants of the College, but is very rarely used; the Root is reckoned to be binding, and good for all Kinds of Fluxes, and of great use to heal Wounds. . . ." (30).

Centaurea — See Centauray or Cornflower

Celandine Poppy, Common or Great Celandine (22) *Chelidonium majus* L.

Native in Europe and northern Asia. ". . . flowering from may to july, during which time it is in the greatest perfection for use. . . . The juice of every part of this plant is very acrimonius. It cures tetters [Herpes] and ringworms. Diluted with milk it consumes white opaque spots on the eyes. It destroys warts, and cures the itch. There is no doubt but a medicine of such activity will one day be converted to more important purposes . . ." (31).

Chequered Lily (32, 35) *Fritillaria meleagris* L.

Native in most of Europe. ". . . Gerarde calls it Turkey-hen or Guinea-hen flower, and Checkered Daffodill. The curious and painful herborist of Paris, John Robin, sent him many plants for his garden where they prospered (as he informs us) as in their

own native country. . . . Some call it, says Parkinson, *Narcissus Caparonius* from the first finder Noel Caparon, an Apothecary then dwelling at Orleans, but shortly after murdered in the massacre of France . . . The country people about Rislip call the flowers Snake-heads. . . ." (31).

Chinese Lantern — See *Alkekengi*

Clove-Gilliflower

Dianthus caryophyllus L.

(21, 26, 32, 34, 35, 40)

Native from southern Europe to India. ". . . grow like unto the Carnations, but not so thick set with joynts and leaves: . . . the flowers are smaller, yet very thick and double in most . . ." (32). Parkinson described 29 varieties.

Colchicum, Meadow Saffron

Colchicum autumnale L.

(21, 32, 33).

Native in Central and Southeastern Europe. ". . . Mr. Miller observed it in England in great plenty, in the meadows near Castle-Bromwich in Warwickshire, the beginning of September; and says that the country people call the flowers Naked Ladies, because they come up without any leaves (They give the same name to Hepatica, and indifferently to any plant, which has flowers on naked scapes, appearing at a different time from the leaves.) . . ." (31). Parkinson described a double flowered variety (32).

Columbine (21, 32)

Aquilegia vulgaris L.

Temperate Europe and Asia. "There are many sorts of Columbine as well differing in forme as colour of the flowers, and of them both single and double carefully nursed up in our Gardens, for the delight both of their forme and colours. . . ." (32).

". . . The root, the herb, the flowers, the seeds have been recommended to be used medicinally, on good authority; but this plant is of a suspicious tribe, and Linnaeus affirms as of his own knowledge, that children have lost their lives by an over dose of it. The virtues ascribed to a tincture of the flowers, as an anti-phlogistic, and for strengthening the gums, and detarging [cleansing] scorbutic ulcers in the mouth, appear to be better founded; the tincture being made with an addition of the vitriolic acid [sulphuric acid], and differing little from our official tincture of roses . . ." (31).

Cornflower, Blew Bottle,

Centaurea cyanus L.

Corn Centaury (21, 32, 35)

Native in most of Europe. ". . . It is a common weed among corn [grain], flowering from june to august, the wild flower is usually blue, but sometimes white or purple. . . . Dr. Stokes informs us, that it is called Bachelor's-buttons in Yorkshire and Derbyshire: but this is a name given to many other flowers. In Scotland it is called Blue Bonnetts. . . . The expressed juice of the neutral florets makes a good ink; it also stains linen of a beautiful blue, but the colour is not permanent in any mode

hitherto used. Mr. Boyle says that the juice of the central florets, with the addition of a very small quantity of alum, makes a lasting transparent blue, not inferior to ultramarine. . . ." (31).

Crocus (21, 32, 35, 40) *Crocus vernus* (L.) All.
(*C. purpureus* Weston)

Native of the mountains of southern and central Europe. Parkinson listed some 29 garden varieties (32).

Crown Imperial (21, 32, 35) *Fritillaria imperialis* L.

Native from Iran to the Himalayas. ". . . This grows naturally in Persia, from whence it was first brought to Constantinople, and about the Year 1570, was introduced to these Parts of Europe, . . ." (30). ". . . Gerarde had great plenty of it in his garden in 1596, he calls it a rare and strange plant. Parkinson (in 1629) had not observed any variety in the colour of the flowers. Lobel, however, enumerated many varieties. . . ." (31). It is worth noting that by the time of Miller (1759) at least twelve garden forms had been recognized.

Daffodill (21, 26, 35), Daffadown Dillies, *Narcissus* sp.
Trumpets, Poets, Doubles, Multiples

—Common Jonquil *Narcissus jonquilla* L.
Cultivated by Gerarde in 1596. Native in southern Europe and Algeria.

—Curtis Primrose Peerless *Narcissus* × *biflorus* Curtis
Narcissus, Pale Daffodil
Probably a hybrid between *N. poeticus* and *N. tazetta*.

—Poetic, Poets, or White Narcissus, *Narcissus poeticus* L.
Pheasant's Eye
Native of southern Europe. Cultivated in England by 1570 according to L'Obel.

—Polyanthus Narcissus *Narcissus tazetta* L.
Gerarde grew it in 1596. Native from the Canary Islands to Japan. ". . . Clusius observed it at the end of january 1565 in Spain and Portugal and at the begining of february at Gibraltar . . ." (31).

—Rush-Leaved Daffodil, *Narcissus triandrus* L.
Angels-Tears
". . . Clusius says that a French herbarist, namer Nicolas le Quelt or Quilt, who searched the Pyrenees and Spain every year, introduced it in 1599 . . ." (31).

—Sweet-scented Narcissus, *Narcissus odoratus* L.
Campernelle Jonquil (*N. Calathinus* L.)
Native in France and Spain. ". . . Clusius first observed them in flower in april 1595, in the garden of Theodoric Clutius or Cluyts, prefect of the Academic Garden at Leyden . . ." (31).

—Wild or Common Daffodil *Narcissus pseudonarcissus* L.

Native in western Europe from Belgium to Portugal, naturalized in Scandinavia and central Europe. Parkinson (32) listed many varieties, several of them double. This is the common wild English Daffodil.

Daisy, Great Daisy *Chrysanthemum leucanthemum* L.
(21, 26, 34), Common Oxe-Eye

Native throughout Europe. A common weed of fields. A double flowered form was known to Parkinson.

—Perennial or Common Daisy *Bellis perennis* L.

Native over much of Europe. “. . . the common Daisy, . . . grows naturally in Pasture Land in most Parts of Europe, and is often a troublesome Weed in the Grass of Gardens, so is never cultivated. . . . The Garden Daisy is generally supposed to be only a Variety of the wild Sort, which was first obtained by Culture. This may probably be true, but there has not been any Instance of late Years of the wild Sort, having been altered by Culture; for I have kept this wild Sort in the Garden upward of thirty Years, and have constantly parted the Roots, and raised many Plants from Seeds, but they have constantly remained the same; nor have I ever observed the Garden Daisy to degenerate to the wild Sort, where they have been some Years neglected, though they have altered greatly with regard to the Size and Beauty of their Flowers. . . .” (30).

Datura — See Thornapple

Daylily (40), *Hemerocallis lilio-asphodelus* L.
Yellow Asphodel Lily, emend. Hylander (*H. flava* L.)
Liriconfancie, Yellow Day Lily

—Red Asphodel Lily, *Hemerocallis fulva* L.
Orange Day Lily

Hemerocallis lilio-asphodelus L. is a native of Eastern Asia, *H. fulva* is known only in cultivation. “. . . These Lilies, says Gerarde, do grow in my garden, and in the gardens of herbarists and lovers of fine and rare plants . . .” (12). Parkinson and Miller both note that while *H. fulva* sets no seed, and the flowers last for but a single day, *H. lilio-asphodelus* does set seed and the individual flowers last for more than one day. Miller further notes of the seeds of *H. lilio-asphodelus* that “. . . if sown in Autumn, the Plants will come up the following Spring, and these will flower in two Years; but if the Seeds are not sown till Spring, the plants will not come up till the year after. . . .” (30). We now know that *H. fulva* is a triploid, and hence sterile, and that it is not known in a wild condition — though allied diploids are found in China.

Dead Nettle (32), *Lamium purpureum* L.
Red or Purple Dead Nettle or Archangell.

—White Archangel

Lamium album L.

Native in Europe. In the time of Parkinson (1640) esteemed for medicinal uses.

Delphinium — See Lark's Spur

Dittany — See Fraxinella

Dianthus — See Clove-Gilliflower

Digitalis, Foxglove (21, 32)

Digitalis purpurea L.

Native in western Europe. Yields a powerful drug, poisonous in large doses. At this period used as a diuretic.

Dogtooth Violet (21, 32, 35)

Erythronium dens-canis L.

Native in central Europe. ". . . The sorts of Dens Caninus do grow in divers places; some in Italy on the *Euganean* Hills, others on the Apenine, and some about Gratz, the chiefe City of Stiris, and also about Bayonne, and in other places. We have had from *Virginia* a root sent unto us, that we might well judge, by the forme and colour thereof being dry, to be . . . the root of this, . . . which the naturall people hold not onely to be singular to procure lust, but hold it as a secret, loth to reveale it. . . ." (32).

Elecampane (22, 26)

Inula helenium L.

Probably native in Central Asia, but now widely naturalized in western Asia, Europe, North America and Japan. ". . . The root is esteemed a good pectoral, and a conserve of it is recommended in disorders of the breast and lungs, as good to promote expectoration. An infusion of it fresh, sweetened with honey, is said to be an excellent medicine in the whooping cough. A decoction of it, applied outwardly, is said to cure the itch. Bruised and macerated in urine, with balls of ashes and whortleberries [*Vaccinium* spp.], it dyes a blue colour. . . ." (31).

Emanies — See Anemone

English Daisy (32, 35) — See Daisy

Epimedium, Barrenwort (32)

Epimedium alpinum L.

Native in southern Europe. ". . . This rare and strange plant (says Gerarde) was sent me from the French King's herbarist, *Robinius*, dwelling in Paris, at the sign of the black head, in the street called *Du bout du Monde*. I planted it in my garden, but it was dried away with the extreme heat of the sun, which happened in the year 1590, since which time it bringeth seed to perfection. . . ." (31).

". . . The Roots if planted in a good Border, should be every Year reduced, so as to keep them within Bounds, otherwise it will spread its Roots and interfere with the neighboring Plants . . ." (30).

Feverfew (32, 35), *Chrysanthemum parthenium* (L.)

Fether-Few (26, 34) Bernh.

Native in Europe. "... It grows naturally in Lanes, and upon the Side of Banks, in many Parts of England, but is frequently cultivated in the Physic Gardens to supply the Markets, ... the whole Plant has a strong unpleasant Odour. The Leaves and Flowers of this are used in Medicine, and are particularly appropriated to the female Sex, being of great Service in all cold flatulent Disorders of the Womb, and hysterick Affections, procuring the *Catamenia*, and expelling the Birth and Secundines. ..." (30).

Four-o-clocks — See Marvel-of-Peru

Foxglove — See Digitalis

Fraxinella, Dittany (21, 32, 35) *Dictamnus albus* L.

Native from southern Europe to northern China. "... There are three Varieties of this Plant, one with a pale red Flower striped with purple, another with a white Flower, and one with shorter Spikes of Flowers; but as I have observed them to vary when propagated by Seeds, so I esteem them only seminal Varieties. ... This is a very ornamental Plant for Gardens, and as it requires very little Culture, so deserves a Place in all good Gardens ..." (30).

"... It is held to be profitable against the stingings of Serpentes, against contagious and pestilent diseases, and to bring down the feminine courses, for the pains of the belly, and the stone, and in Epileptical diseases, and other cold pains of the brains: the root is the most effectual for all these, yet the seed is sometimes used. ..." (32).

Fritillaria — See Chequered Lily and Crown Imperial

Geranium, Cranesbill (32) *Geranium sanguinum* L.

Native from southern Scandinavia to Portugal and Greece. "... Petals obcordate, very large, pale red, with deeper veins, hairy at the base. The whole plant frequently turns red or purple after flowering. ... Flowering most parts of the Summer, and often introduced into gardens as an ornamental plant. ..." (31).

—Long-Rooted Cranesbill *Geranium macrorrhizum* L.

Native from south-eastern France to Italy, Austria and the Balkans. "... The whole plant, when rubbed, emits an agreeable odour. ... Cultivated in the Botanic Garden at Oxford in 1658 ..." (31).

—Tuberous-rooted Cranesbill *Geranium tuberosum* L.

Native in southern Europe "... the root is tuberous and round like unto the root of the *Cyclamen* or ordinary sowerbread

almost, but smaller, and of a dark russet colour on the outside, and white within, which doth encrease underground, by certain strings running from the mother root into small round bulbes, like unto the roots of the earth chestnut . . ." (32).

—Herb Robert

Geranium robertianum L.

Native throughout Europe and temperate Asia. Naturalized in the United States. ". . . the whole is beset with pellucid hairs. . . . It has a disagreeable rank smell when bruised . . . A decoction of Herb Robert has been known to give relief in calculous cases. It is considerably astringent, and is given to cattle when they make bloody water or have the bloody flux. . . ." (31).

Germander (16, 17)

Teucrium chamaedrys L.

Native in southern and central Europe, the Near East, and Morocco. ". . . The Chamaedrys or Germander has been esteemed chiefly as a mild aperient and corroborant: and was recommended in uterine obstructions, intermitting fevers, rheumatism and gout. Of the last mentioned complaint the Emperor Charles the Fifth is said to have been cured, by a vinous decoction of it, with some other herbs, taken for sixty successive days. . . ." (31).

Gladiolus, Corn Flag (21, 32, 35)

Gladiolus sp.

There are at least two "hardy" gladioli which have been cultivated since before the time of Gerarde (1596). They are native in southern and eastern Europe. They are probably not hardy in the United States north of Virginia.

—French Corne Flagge

Gladiolus communis L.

In this the pedicels of the tubular flowers twist so that the florets form a single line of flowers one above the other.

—Italian Corne Flagge

Gladiolus communis L.

This plant is similar, but the flowers flair open and are arranged in two ranks, one on each side of the rhachis.

—Corne Flagge of Constantinople

Gladiolus byzantinus Miller

The flower has larger florets than the other two; brought into cultivation by 1629.

Globe Amaranth (32)

Gomphrena globosa L.

Native in tropical Asia. ". . . It was cultivated in 1714 by the Dutchess of Beaufort; but was not common in the English gardens till 1725. It was raised first in Holland about 1670. ". . . The flowering heads are beautiful, and if gathered before they are too far advanced, will retain their beauty several years . . ." (31).

Grape Hyacinth, Faire Haird

Muscari comosus (L.) Miller

Iacinth (Gerarde), Great Purple Faire Haired

Iacinth (Parkinson)

Native of western Europe and North Africa. ". . . The flower stalk rises about a foot (or eighteen inches) in height, round, upright, smooth, glaucous green. The lower half is naked, but the upper part has a loose raceme of flowers, frequently for a foot in length. The lower flowers are farther asunder, before they flower they are upright, but whilst they flower, and afterwards, they stand out horizontally, on pedicels half an inch in length; their colour is a yellowish green, with blue or purple at the end, these are fertile. The upper ones are smaller, barren, stand upright, form a corymb, and are blue or violet, as are also their long pedicels. . . . Gerarde, who cultivated it in 1596, calls it Faire haired Iacint; Parkinson, Great purple Faire haired Iacinth; . . . It is distinguished more by its singularity than its beauty, . . ." (31).

—Great Grape-flower *Muscari botryoides* (L.) Miller
(Gerarde), Skie-Coloured Grape Flower (Parkinson)

Native in southern Europe. ". . . where it is once planted in a garden, it is not easily rooted out. . . . There are three varieties of this, one with blue, another with white, and a third with ash-coloured flowers . . . Parkinson enumerates three varieties the white, the blush-coloured and the branched: the first is frequently imported with other bulbs from Holland; the last seems to be a curious variety and was obtained, according to Clusius, from the white . . ." (31).

—Blew Grape Flower *Muscari racemosum* (L.) Miller

Native of the south of Europe, in corn fields. ". . . It was cultivated by Gerarde in 1596. He calls it Blew Grape-flower; and Parkinson, darke blew Grape-flower. . . . This is much more common in our gardens than the botryoides, and flowers in april and may. . . ." (31).

Ground Ivy, Ale-Hoof (22) *Nepeta hederacea* (L.) Trev.
(*Glechoma hederacea*) (4)

Native from western Europe to Japan. Extensively naturalized in the eastern United States. ". . . It gradually expels plants which grow near it, and thus impoverishes pastures. The leaves were formerly thrown into the vat with ale to clarify it, and to give it a flavour. . . ." (31). ". . . Ground Ivie bruised and put into the eares, taketh away the humming and noise of ringing sounds of the same, and is good for such as are harde of hearing. . . ." (27).

Hellebore, Black Helleborus or *Helleborus niger* L.
Christmas Rose (1, 32, 35)

Called "the black flower at Christmas" by William Hughes in *The Flower Garden and Compleat Vineyard* (1683). Native in central and southern Europe. ". . . Most, if not all the Hellebores produce very powerful effects when used medicinally. . . . Although many writers consider this root as a perfectly innocent and safe medicine, yet we find several examples of its poisonous effects; it should, therefore be used with proper cau-

tion. It seems to have been principally from its purgative qualities that the ancients esteemed this root such a powerful remedy in maniacal disorders . . ." (31).

Hepatica, Liverwort (21, 32, 35) *Hepatica nobilis* Miller

Native in temperate Europe. ". . . These Plants are some of the greatest Beauties of the Spring; their Flowers are produced in February and March in great Plenty, before the green Leaves appear, and make a very beautiful Figure in the Borders of the Pleasure Garden, especially the double sorts, . . ." (30). ". . . The double kinde likewise hath been sent from Alphonsus Pantius out of Italy, as Clusius reporteth, and was also found in the Woods, near the Castle of Starnberg in Austria, the Lady Heusenstain's possession, as the same Clusius reporteth also . . ." (32).

Herb Robert — See Geranium

Hollyhock, Garden or *Althaea rosea* (L.) Cavanilles
French Mallow. (21, 22, 26, 32)

Native in China. ". . . The great tame Mallow which beareth the beyondsea or winter rose, hath great round rough leaves . . . The stalke is rounde, and groweth sixe or seven foote high or more: it beareth fayre great flowers of divers coloures, in figure lyke to the common Mallowe or Hocke: but a great deale bigger, sometimes single, sometimes double . . ." (27). ". . . The colours of their flowers being accidental, and the double flowers being only varieties which have risen from culture, I have not enumerated them here, but shall only mention the various colours which are commonly observed: these are white, pale, red, deep-red, blackish-red, purple, yellow and flesh colour. Besides these, I many years ago saw some plants with variegated flowers, in the garden of the late Lord Burlington in London, raised from seeds which came from China. . . ." (31).

Hyacinth, Jacinth, Blue-bell (21, 26, 35) *Endymion nonscriptus* (L.) Garcke
(*Scilla nonscripta* (L.)
Common Hyacinth, Harebell Hoffmansegg and Link)

Native in western Europe. ". . . It adorns our woods, coppices, and hedge-rows, with its flowers in the spring months . . ." (31).

—Garden Hyacinth *Hyacinthus orientalis* L.

Native from Greece to Syria and Asia Minor. ". . . It is very abundant about Aleppo and Bagdat, where it flowers in February. Lepechin found it not only with purple, but with yellow flowers in Russia. With us it flowers in March and April; and was cultivated by Gerarde in 1596. Probably earlier, since neither he nor Parkinson speak of the Hyacinth as a flower then new in cultivation . . ." (31). ". . . the roots of Hyacinthe boyled in wine and dronken, stoppeth the belly, provoketh urine, and helpeth much agaynst the venomous bitings of the field Spider . . ." (27).

Iris (21, 34, 35, 40)

Iris sp.

—Flag, "Blue and Varied" (35, 40) *Iris pumila* L.

Native from Central Europe to Asia Minor. Cultivated by Gerarde 1596. ". . . There are many varieties of this sort, with white, straw-coloured, pale blue, blush-coloured, yellow-variable. blue-variable, and other colours in the flowers, which are now in great measure neglected . . ." (31).

—Florentine Iris, *Iris germanica* L., var.
White Flower de Luce *florentina* (Ker.) Dykes

Cultivated by Gerarde in 1596. ". . . It resembles *I. germanica* very much, but differs in having the petals white and entire . . ." (31).

—Flower de Luce *Iris germanica* L.
"This Flower de luce . . . is most common in gardens . . ." (32).

—Great Turkie Flower de Luce, *Iris susiana* L.
Chalcedonian Iris, Mourning Iris

Probably native in Lebanon. ". . . It takes the name from Susa in Persia. Clusius informs us that this magnificent Iris was brought from Constantinople to Vienna and Holland in 1573. In 1596 it was cultivated by our Gerarde . . ." (31)

—Hungarian Iris *Iris sibirica* L.
The small variable Hungarian Iris of Clusius (32).

—Persian Iris *Iris persica* L.
Native in Asia Minor. ". . . Cultivated here in the time of Parkinson (1629), who remarks that it was then very rare, and seldome bore flowers . . . Like the Hyacinth and Narcissus it will blow within doors in a water-glass, but stronger in a small pot, of sand or sandy loam, and a few flowers will scent a whole apartment . . ." (31).

—Yellow Flagg, Skeggs, Lugs *Iris pseudacorus* L.
Native in Europe, North Africa and Syria. "the root of this water Flagge is very astringent, cooling and drying thereby helping all Laskes and Fluxes, whether of Blood or Humors . . ." (33).

—Yellow Flower de Luce *Iris variegata* L.
Cultivated by Gerarde in 1596. Considered to be one of the parents of the *I. germanica* group. ". . . This yellow variable Flower de luce loseth his leaves in winter, contrary to all the former Flower de luces . . ." (32).

Lark's Spur, Lark's heel, *Delphinium consolida* L.
Delphinium (21, 32, 35), Lark's Claw, Lark's Toes,
Wild or Corn Lark's Spur.

Native in Europe and western Asia. ". . . The expressed juice of the petals, with the addition of a little alum, makes a good blue ink . . ." (31).

- Upright or Garden Lark's Spur *Delphinium ajacis* L.

Native in Mediterranean region. ". . . The seed of the garden Larkes Spurre drunken is very good agaynst the stinging of Scorpions, and in deede his vertue is so great against their poyson, that the only herbe throwen before the Scorpions, doth cause them to be without force or power to do hurte, so that they may not move or sturre, until this herbe be taken from them . . ." (27).

- Leucojum, Autumnal Snow-drop *Leucojum autumnale* L.

Native in the Mediterranean region.

- Summer Snow-drop, Great Late-flowering Bulbous Violet. *Leucojum aestivum* L.

Native in Central and Southern Europe.

- Lily (26) *Lilium* sp.

- Common White Lily (32) *Lilium candidum* L.

Native from southern Europe to Southwest Asia. ". . . The water of the flowers distilled . . . is used . . . of divers women outwardly, for their faces, to cleanse the skin, and make it white and fresh . . ." (32).

- Martagon Imperiale (21, 32, 35) *Lilium martagon* L.

Native from southern Europe to Japan. Cultivated in 1596 by Gerarde as Martagon Imperiale.

- Spotted Martagon of Canada (32) *Lilium canadense* L.

Native from Quebec to Virginia. ". . . This, says Parkinson, was brought into France from Canada by the French colony [sic], and thence unto us, in 1629 . . . It is found in other parts of North America; for Catesby says it was sent to Mr. Collinson from Pennsylvania and flowered several years in his garden . . ." (31).

- Lily-of-the-valley *Convallaria majalis* L.

Native through Europe and Asia. ". . . Camerarius setteth downe the manner of making an oyle of the flowers hereof, which he saith is very effectual to ease the paine of the Gout, and such like diseases, to be used outwardly, which is this; Having filled a glasse with the flowers and being well stopped, set it for a moneths space in an Ants hill, and after being drayned clear, set it by to use . . ." (32).

- Linaria — See Toad-flax

- Lungwort (32), Cowslips of Jerusalem *Pulmonaria officinalis* L.

Native from Central and Northern Europe to the Caucasus. ". . . It is much commended of some, to be singular good for ulcered lungs, that are full of rotten matter . . ." (32).



- Lupine (21, 32, 35) *Lupinus perennis* L.
Native from Maine to Florida. “. . . It is native of Virginia and other parts of North America; and was cultivated in the botanic garden at Oxford in 1658 . . .” (31).
- White Lupine *Lupinus albus* L.
Native in the Levant. “doth scoure and cleanse the skin from spots, morpew, blew marks, and other discolourings thereof, being used either in a decoction or ponther . . .” (32).
- Great Blue Lupine *Lupinus hirsutus* L.
Cultivated by Parkinson in 1629. Native in southern Europe. “. . . The pods are large, almost an inch broad, and three inches long . . .” (31).
- Mallow, French — See Hollyhock
- Marigold (32, 35) Marygold, *Tagetes patula* L.
French Marygold, *Flos Africanus*, *Flos Africanus Multiplex* (21, 35)
Native in Mexico. “Dodoneus . . . affirms that it grows spontaneously in Africa, and was first brought into Europe by the Emperor Charles V after his expedition against Tunis. But that was in the year 1535; and Fuchsius in 1542, figures the plant under the name of *Tagetes indica*: it has never been found in Africa. Hernandez mentions it in his history of Mexico; and the variety figured by Dillenius, which flowered in the Eltham garden in 1727, was produced from Mexican seeds . . . it was common with us in Gerarde’s time . . . 1597 . . .” (31).
- Aztec Marigold, African Marigold *Tagetes erecta* L.
Native in Mexico. Cultivated by Gerarde in 1596. “. . . Parkinson remarks that the flower is of the very smell of new wax, or of an honie combe, and not of that poisonfull sent of the smaller kindes . . .” (31).
- Marvel-of-Peru (21, 26, 32, 35) *Mirabilis jalapa* L.
Native in tropical America. “. . . These . . . are very ornamental plants in the flower garden during the months of july, august, and september, . . . the flowers do not open till towards the evening whilst the weather continues warm, but in the moderate cool weather, when the sun is obscured, they continue open almost the whole day . . . It was cultivated here by Gerarde many years, as he says, before the publication of his Herbal in 1597 . . .” (31).
- Meadow Rue, Feathered Columbine *Thalictrum flavum* L.
(1, 32), Common Meadow Rue
Native in Europe and temperate Asia. “. . . A cataplasm made of the bruised leaves is a slight blister, and has been known to give relief in the Sciatica. The root dyes wool yellow; . . .” (31). The name “Feathered Columbine” is used now for the

Thalictrum aquilegifolium L., another European species. However it seems that this did not come into cultivation in England, at least, before 1731.

Monarda, Blue (40),

Monarda fistulosa L.

Purple Monarda, Wild Bergamot

Native from Quebec and Ontario to Florida and Texas. ". . . Cultivated in 1656 by Mr. John Tradescant, jun. . . ." (31).

Morning Glory — See Blew Bindweed

Mullein, Verbascum (21, 32, 35),

Verbascum thapsus L.

Great Mullein or Aaron's Rod

Native in most of Europe and western Asia, widely naturalized on dry soils, gravel banks, or pastures and the like in eastern North America. It was a common plant in fields around Boston by 1824. ". . . The leaves and whole herb are mucilaginous, and recommended as emollients both internally and externally. A pint of Cow's Milk with a handful of leaves, boiled in it to half a pint, sweetened with sugar, strained and taken at bed-time, is a pleasant emollient and nutritious medicine for allaying a cough, and more particularly for taking off the pain and irritation of the piles . . ." (31).

—Moth Mullein

Verbascum blattaria L.

Native in temperate Europe eastward to western and central Asia, also in North Africa.

Nasturtium, Indian Cress, Great Indian

Tropaeolum majus L.

Cress (21, 32, 35)

". . . The flowers are frequently eaten in salads; they have a warm taste like the garden cress, and hence the plant has its common name of Nasturtium; they are likewise used for garnishing dishes. The seeds are pickled, and by some are preferred to most pickles for sauces under the false name of capers . . ." (31).

Nigella, Fennel Flower (21, 32, 35)

Nigella damascena L.

Native in southern Europe. ". . . It was cultivated here in 1570, as appears from Lobel . . ." (31).

Nonesuch — See Rose Campion

Pansy, Heart's Ease (3, 26, 32)

Viola tricolor L.

Native in northern and central Europe. ". . . Linnaeus remarks the black line which sometimes appear on the petals; and gave occasion to Milton's expression of 'Pansies streakt with jet' . . . It has ever been a favorite flower with the people . . ." (31).

Pelletory, Paritary (32, 35)

Parietaria officinalis L.

Native in eastern and central Europe. ". . . The dried herbe Paritary made up with honey into an electuarie, or the juice of

the herb, or the decoction thereof made up with Sugar or Hony, is a singular remedy for for any old continuall or dry cough. . . . (33).

Peony (21, 26, 32, 34), Male Peony *Paeonia mascula*
Female Peony *P. officinalis* L. (L.) Miller

Native in southern Europe. "There are two principall kinds of Peonie, that is to say, the Male and the Female. Of the Male kind I have only known one sort, but of the Female a great many; . . . The Male his leaf is whole, without any particular division, notch or dent on the edge, . . . The Female of all sorts hath the leaves divided or cut on the edges . . ." (32).

Poppy, French Poppy, Field Poppy *Papaver rhoeas* L.
(21, 26, 32, 35)

Native in Europe, Asia, and North Africa, occasionally found as an escape in eastern North America. ". . . There are several Varieties of this with double Flowers cultivated in Gardens; some of them have white Flowers, others have red Flowers bordered with white, and some have variegated Flowers; . . ." (30). The red double-flowered form was cultivated by Parkinson in 1629.

—White Poppy, Black Poppy, *Papaver somniferum* L.
Opium Poppy

Native in Greece and sub-tropical Asia, occasionally escaped from cultivation in eastern North America. ". . . It is not unknown, I suppose to any, that Poppie procureth sleepe, for which cause it is wholly and only used, as I think: . . ." (32).

Primrose, Cowslip (21, 26), Bear's *Primula vulgaris* Hudson
Ears (21, 32)

Native in Europe, Asia Minor, and North Africa. Flowering peduncle lacking or very short. ". . . I . . . call those only Primroses that carry but one flower on a stalk, be they single or double . . ." (32).

—Bear's Ears *Primula auricula* L.

Native in the Alps. ". . . From Gerarde's herbal it appears that the Auricula was cultivated in 1597 . . . to enumerate all the diversities of this plant would be almost endless; for every year produces vast quantities of new flowers . . ." (31).

—Cowslip, Paigle *Primula veris* L.

Native in Europe and temperate Asia. ". . . The fragrant flowers make a pleasant wine, approaching in flavour to the Muscadel wine of the South of France. . . ." (31).

Ranunculus (21, 32, 35), *Ranunculus asiaticus* L.
Crowfoot (32, 35)

Native in southwestern Europe and southwestern Asia. ". . . Mr. Miller says it was originally brought from Persia; but

since it has been in Europe, many new varieties have been obtained from seeds . . ." (31). It was cultivated by Gerarde in 1696; Parkinson listed eight varieties in 1629.

——Grassy Crowfoot *Ranunculus gramineus* L.

" . . . Parkinson figures it with double flowers, but describes it with semi-double ones only . . . that with single flowers was cultivated by Gerarde in 1596 . . ." (31).

——Fair Maid of France, *Ranunculus aconitifolius* L.
Aconite-leaved Crowfoot

Native in Central Europe, from Spain to Jugoslavia. " . . . The double-flowering variety has been obtained by seeds, and is preserved in many curious gardens for the beauty of its flowers. It is by some gardeners called Fair Maid of France . . . Gerarde in 1597 'it groweth in the gardens of Herbarists, and lovers of strange plants, whereof we have good plentie, . . .'" (31).

——Bulbous Crowfoot *Ranunculus bulbosus* L.

Native in Europe and Western Asia, naturalized throughout much of North America. " . . . The flowers are sometimes double . . . Like most Crowfoots it possesses the property of inflaming and blistering the skin; . . . According to Hoffmann, beggars make use of them to blister their skins with a view to exciting compassion . . ." (31).

——Yellow Batchelor's Buttons *Ranunculus acris* L.

The garden form is of apparently obscure origin. " . . . It is frequent in gardens with a double flower, among other herbaceous perennials, under the name of yellow Batchelor's Buttons . . ." (31).

Rocket, Dames Violet (32, 35) *Hesperis matronalis* L.

Native in Europe and in Western and Central Asia. " . . . The Garden Rocket with purple flowers was formerly in greater plenty in English gardens than at present, having been long neglected because the flowers were single, and made but little appearance: however, as they have a very grateful scent, the plant is worthy of a place in every good garden . . . Gerarde in 1597 speaks of it as being then sown in gardens for the beauty of the flowers. And Johnson adds (1633) that by the industry of some of our florists, within two or three years hath been brought unto our knowledge a very beautiful kind of these Dames Violets, having very fair double white flowers. . . ." (31).

Rose Campion, Maltese Cross *Lychnis chalcedonica* L.
(21, 32, 35) Nonesuch, Flower of Constantinople,
Flower of Bristow, Flower of Bristol.

Native in Russia. " . . . Cultivated in 1596 by Gerarde. In his time it was common in almost every garden; but he does not mention any of the varieties. Parkinson in 1629 and Johnson in 1633 have the varieties; but the latter says that 'the white

and blush single and the double one are not to be found but in the gardens of our prime Florists' . . ." (31).

Scabiosa, Sweet Scabious (35) *Scabiosa atropurpurea* L.

Native in Southern Europe. ". . . The sorts of Scabious being many, yeeld not flowers of beauty or respect, fit to be cherished in our garden of delight; and therefore I leave them to the Fields and Woods, there to abide. I have only two or three strangers to bring to your acquaintance, which are worthy this place . . ." (32).

Sea Holly (32) *Eryngium maritimum* L.

Native on the coasts of Europe from the Baltic to the Black Sea. ". . . By old English writers it is called Sea Holly, Sea Holme, and Sea Hilver. . . ." (31).

Sensitive Plant (35) *Mimosa pudica* L.

Native in tropical America. ". . . Parkinson calls it Mimick, Mocking or Thorny Sensitive Plant or shrub, and says that he saw a living plant of it in a pot at Chelsey in Sir John Davers garden, where divers seeds being sown about the middle of May 1638 and 1639, some of them sprang up to be near half a foot high. . . ." (31).

Snapdragons (21, 32) *Antirrhinum majus* L.

Native in the Mediterranean region. ". . . There is some diversity in the Snapdragons, some being of a larger, and others of a lesser stature and bigness; and of the larger, some of one, and some of another colour . . ." (32).

Star of Bethlehem, *Ornithogalum umbellatum*, L.
Ornithogallum (32, 35)

Native in the Mediterranean region. Naturalized in eastern North America from Newfoundland to Nebraska southward to North Carolina and Mississippi. ". . . The ordinary Star of Bethlehem is so common, and well known in all countries and places, that it is almost needless to describe it. . . ." (32).

Stock-Gilliflower, Wall- *Matthiola incana* (L.) Robert Brown
flower (21, 26, 34, 35)

Native in southern Europe, Asia Minor, and North Africa. ". . . The Stock-Gilliflower is of very long standing in the English Gardens. Johnson [1633] gives a figure of the double stock, which was not in Gerarde's original work, and observes that many and pretty varieties of it were kept in the garden of his kind friend Master Ralph Tuggye at Westminster: we may conclude, therefore that double Stocks [Brompton Stocks] were not known in Gerarde's time (1596) . . ." (31).

Strawflowers, Everlastings (32) *Helichrysum stoechas* (L.)
DeCandolle

Native in southern Europe ". . . the whole Plant is very woolly, the Flowers terminate the Stalks, in a compound Corym-



bus; . . . If these are gathered before the Flowers are much opened, the Heads will continue in Beauty many years, especially if they are kept from the Air and Dust . . ." (30).

—American Everlasting, *Anaphalis margaritacea* (L.)
Cudweed (31) Bentham

Native in North America. ". . . A decoction of the flowers and stalks is used in America, to foment the limbs, for pains and bruises . . ." (31).

Sunflower (21) *Helianthus annuus* L.

Native in Western North America. ". . . sometimes the heads of the Sun-flower are dressed, and eaten as Hartichokes are, and are accounted of some to be good meat, but they are too strong for my taste . . ." (32).

Sweet John — See Armeria

Sweet Peas, Perennial (35) *Lathyrus latifolius* L.

Native in southern Europe. ". . . It is a showy plant for shrubberies, wilderness quarters, arbours, and trellis work; but too large and rampant for the borders of the common flower garden . . ." (31).

Sweet William — See Armeria

Thornapple (32), Jimson Weed *Datura stramonium* L.

Native in tropical Asia, widely naturalized in North America. ". . . That it is a native of America . . . we have the most undoubted proofs, . . . Kalm says that it grows about the villages and that this and the *Phytolacca* are the worst there . . ." (31).

Toad Flax, Wild Flax (35) *Linaria vulgaris* Miller

Europe and western Asia, naturalized in the United States. ". . . In Worcestershire it is called Butter and Eggs. Gerarde names it Wild Flaxe, Tode Flaxe, and Flaxweede. . . . The juice mixed with milk, is a poison to flies . . ." (31).

Tomato (21, 32, 35) *Lycopersicum esculentum* Miller

Native in Peru and Ecuador ". . . In the hot countries where they naturally grow, they are much eaten of the people, to cool and quench the heat and thirst of their hot stomachs . . . we only have them for curiosity in our gardens, and for the amorous aspect or beauty of the fruit . . ." (32).

Tulips (21, 32, 35), *Tulipa gesneriana* L.
"Doubles and Singles" *Tulipa clusiana* DeCandolle

Native in Asia Minor. ". . . Conrad Gesner first made the eastern Tulip known by a description and figures . . . he tells us that he first saw it in the beginning of april 1559 at Augsburg, in the garden of John Henry Harwart. . . . Balbinus asserts that Busbequius brought the first Tulip roots to Prague, whence they were spread all over Germany . . . the Tulip

was cultivated in England by Mr. James Garret, in 1577 . . .” (31). “Broken” types were commonly requested. These, it will be recalled, are the result of a virus infection.

Valerian (26, 19), Official or
Great Wild Valerian

Valeriana officinalis L.

Native in temperate Europe and Asia. “. . . It is well known that cats are much delighted with the roots. Dr. Stokes informs us that rats are equally fond of them, and that rat-catchers employ them to draw the rats together . . .” (31).

—Red Valerian

Kentranthus ruber (L.) DeCandolle

Native in Central and Southern Europe, North Africa and Asia Minor. “Gerarde says it grew plentifully in his garden, being a great ornament to the same, and not common in England. Parkinson, that it grows in our gardens chiefly, for we know not the natural place of it . . .” (31).

Violets (17, 18), Sweet Violets

Viola odorata L.

Native in most of Europe, Asia Minor and North Africa. “. . . The Garden Violets (for the wild I leave to their owne place) are so well known unto all, that either keep a garden, or have but once come into it, that I shall (I think) but lose labour and time to describe that which is so common . . .” (32). “. . . The flowers of violets, taken in the quantity of a dram or two, act as a mild laxative . . . The syrup is very useful in chemistry, to detect an acid or an alkali; the former changing the blue colour to a red, and the latter to a green . . .” (31).

Wallflowers (26, 35), Keiri

Cheiranthus cheiri L.

Probably native in the Eastern Mediterranean region. “. . . the common Wall-flower . . . is common on old walls and buildings in many parts of England. It is one of the few flowers which have been cultivated for their fragrancy time immemorial, in our gardens . . .” (31).

Yarrow (39)

Achillea millefolium L.

Native in Europe and Western Asia. Naturalized in North America. Common in fields and pastures around Boston by 1824. “. . . The inhabitants of Dalekarlia mix it with their ale, instead of hops, in order to increase the inebriating quality of the liquor . . . an ointment is made of it for the piles and it is reckoned good against the scab in sheep . . .” (31).

Yucca (32)

Yucca gloriosa L.

Native along the coast from North Carolina to Florida. “. . . First cultivated in Europe by John Gerarde, who had it from the West Indies, ‘by a servant of a learned and skilful Apothecare of Excester, named Master Thomas Edwards’. Parkinson adds, that Gerarde kept it to his death, but that it perished with him who got it from his widow, intending to send it to his country house. Gerarde sent it to Robin at Paris, and Vespasian the son of old Robin sent it to Master John de Franqueville, which plant was flourishing in Parkinson’s Garden when he published his *Paradisus* in 1629 . . .” (31).



II Herbs, Aromatic, Culinary, and Medicinal, before 1700

- Alkanet, Bugloss (32) *Anchusa sempervirens* L.
Native in southern Europe. Cultivated in Britain for many years.
- Angelica (26, 32) *Angelica archangelica* L.
Native in Europe and Asia. Cultivated in Britain in 1568.
- Anise (22, 26) *Pimpinella anisum* L.
Native from Greece to Egypt. Cultivated in Britain in 1551.
- Basil (21, 32, 35) *Ocimum basilicum* L.
Native in the Old World tropics. Cultivated in Britain in 1596.
- Balm, Baum (32) *Melissa officinalis* L.
Native in the Mediterranean region. Cultivated in Britain by 1596.
- Bee-flower (32) *Ophrys apifera* Hudson
Native in Britain. Collected, but probably not cultivated, as a source of Salep.
- Borage (26, 32) *Borago officinalis* L.
Native in Europe and North Africa. Long cultivated in Britain.
- Burnett (22, 32) *Sanguisorba officinalis* L.
Native in Europe and Asia. Both long used in Britain.
- Caraway (32) *Carum carvi* L.
Native in Europe. Long cultivated.
- Catnip, Catmint (32) *Nepeta cataria* L.
Native in Europe and west and central Asia. Long cultivated.
- Chamomile (26, 32) *Anthemis nobilis* L.
Native in western Europe, North Africa and the Azores. Long cultivated.
- Chervil (22, 32) *Anthriscus cerefolium* (L.) Hoffman
Native in eastern Europe, and southern and central Asia. Cultivated in Britain in 1597.
- Chives, Cives, Chibbals (26) *Allium schoenoprasium* L.
Native in Europe and Asia. Cultivated in Britain in 1597.
- Clary (22, 26) *Salvia sclarea* L.
Native in southern Europe. Cultivated in Britain in 1562.

- Comfrey (22) *Symphytum officinale* L.
Native in Europe and Asia. Long cultivated.
- Coriander (22, 26, 34) *Coriandrum sativum* L.
Probably native in the eastern Mediterranean region. Long cultivated.
- Castmary, Bibleleaf (32) *Chrysanthemum balsamita* L.
Native in western Asia. Long cultivated.
- Cress (32) *Lepidium sativum* L.
Native in western Asia. Long cultivated.
- Dill (26, 32) *Anethum graveolens* L.
Native in Europe. Cultivated in Britain in 1597.
- Dock (32), Patience Dock, Rhubarb *Rumex patientia* L.
Native in Europe, western Asia and North Africa. Cultivated in Britain in 1597.
- Fennel (26, 32) *Foeniculum vulgare* Miller
Native in the Mediterranean region. Long cultivated.
- Flax (39) *Linum usitatissimum* L.
Origin unknown. Long cultivated.
- Houseleek (4) Probably *Sempervivum tectorum* L.
Origin unknown. Naturalized all over Europe. Long cultivated.
- Hyssop, Isop (32, 34, 35) *Hyssopus officinalis* L.
Native in southern Europe and western Asia. Cultivated in Britain in 1596.
- Lavender (21, 22, 26, 32, 34, 35) *Lavandula officinalis* Chaix
Native in the Mediterranean region. Cultivated in Britain in 1568.
- Lovage (26) *Levisticum officinale* K. Koch
Native in southern Europe. Cultivated in Britain in 1596.
- Licorice, Liquorice (26, 32, 39) *Glycyrrhiza glabra* L.
Native in the Mediterranean region. Cultivated in Britain in 1558.
- Madder (39) *Rubia tinctorum* L.
Native in the Mediterranean region. Cultivated in Britain in 1597.
- Marjoram, Sweet (21, 32, 35, 39) *Majorana hortensis* Moench
Native in Europe. Long cultivated.
- Mints, Garden Mints (26, 32, 38)
Native in Europe. Long cultivated.

- Corn Mint *Mentha arvensis* L.
 ———Horse Mint *Mentha longifolia* Hudson
 (*M. sylvestris* L.)
 ———Pennyroyal (22, 26, 32, 35, 39) *Mentha pulegium* L.
 ———Peppermint *Mentha piperata* L.
 ———Spear-mint (22, 32) *Mentha spicata* L.
 (*M. viridis* L.)
 Mustard (32) *Brassica nigra* (L.) K. Koch
 Naturalized throughout south and central Europe. Long
 cultivated.
 Parsley (26, 32) *Petroselinum crispum* (Miller) Nymann
 var. *latifolium* (Miller) Airy-Shaw
 Native in southern Europe. Long cultivated.
 Purslane (22, 32, 34, 39) *Portulaca oleracea* L.
 A cosmopolitan weed of warm climate. Cultivated in Britain
 in 1562.
 Rhubarb (32) *Rheum rhaponticum* L.
 Native in Siberia. Cultivated in Britain in 1629.
 Rosemary (21, 22, 26, 32, 34, 35) *Rosmarinus officinalis* L.
 Native in southern Europe. Long cultivated.
 Rue (26, 32) *Ruta graveolens* L.
 Native in southern Europe. Long cultivated.
 Saffron (26, 39) *Crocus sativus* L.
 Probably native in Asia Minor. Long cultivated.
 Sage (21, 22, 26, 32, 34, 35) *Salvia officinalis* L.
 Native in the Mediterranean region. Cultivated in Britain
 in 1597.
 Santolina, Lavender Cotton (22, 32) *Santolina chamaecyparissus* L.
 Native in the Mediterranean region. Cultivated in Britain
 in 1596.
 Savory, Summer (26) *Satureja hortensis* L.
 ———Savory, Winter *S. montana* L.
 Native of Europe. Cultivated in Britain in 1562.
 Skirret (26, 32) *Sium sisarum* L.
 Native in eastern Asia. Cultivated in Britain in 1597.

- Sorrel (22, 39) *Rumex acetosa* L.
Native in the North Temperate Zone. Long used.
- Southernwood (21, 22, 26) *Artemisia abrotanum* L.
Native in Europe. Cultivated in Britain in 1596.
- Sweet Cicely (26) *Myrrhis odorata* (L.)
Scopoli
Native in Europe. Cultivated in Britain in 1597.
- Tansy (22, 26, 32) *Tanacetum vulgare* L.
Native in Europe and Asia. Long cultivated.
- Tarragon (32) *Artemisia dracunculus* L.
Native in Europe. Cultivated in Britain in 1596.
- Thyme, Time (22, 26, 32) *Thymus serpyllum* L.
Native in northern Europe. Long cultivated.
- Garden Thyme *Thymus vulgaris* L.
Native in southern Europe. Cultivated in Britain in 1596.
- Tobacco (32) *Nicotiana tabacum* L.
N. rustica L.
Native in tropical America. Introduced to Britain by 1570.
- Woad (39) *Isatis tinctoria* L.
Native in central and southern Europe. Cultivated since pre-historic time.
- Yarrow (39) *Achillea millefolium* L.
Native in Europe and western Asia. Long cultivated.



III Vegetables and Field Crops Before 1700

Artichoke (5, 26, 32, 34)

Cynaria scolymus L.

" . . . In some parts it is eaten raw in its wild state, by the common people, and surely, must be a most wretched food. It is said to dye a good yellow: and the flowers are used instead of rennet to turn milk for cheese . . . We learn from Turner that the Artichoke was certainly cultivated in England in 1551. We probably had it sooner." (31).

Artichoke, Jerusalem (32)

Helianthus tuberosus L.

Cultivated in England at least by 1617. " . . . We in England, from some ignorant and idle head, have called them Artichokes of Jerusalem, only because the root, being boiled, is in taste like the bottom of an artichoke head; the Franks brought them first from Canada into these parts . . . [they] . . . are by reason of their great increasing, grown to be so common here with us at London, that even the most vulgar begin to despise them, where as when they were first received among us, they were dainties for a queen . . ." (32).

Asparagus, Sperage (22, 32, 39)

Asparagus officinalis L.

" . . . The first shoots or heads of Asparagus are a Sallet of much esteem with all sorts of persons, as any other whatsoever, being boiled tender, and eaten with butter, vinegar, and pepper, oyl and vinegar, or as every ones manner doth please; and are almost wholly spent for the pleasure of the palate. It is specially good to provoke urine, and for those that are troubled with stone or gravel in the veins or kidneys, because it doth a little open and cleanse those end parts . . ." (32).

Barley (22, 39)

Hordeum vulgare L.

" . . . The ancients fed their horses with barley, as we do with oats. It was eaten also in bread by the lower sort of people; and the Gladiators were called *Hordearei*, from their feeding on this grain . . ." (31).

Beans, French or Kidney Beans,

Phaseolus vulgaris L.

(5, 22, 23, 24, 34, 39)

Cultivated in England in the time of Gerarde 1596. " . . . The Garden Beans serve (as I said before) more for the use of the poor than of the rich. I shall therefore only shew you the order the poor take with them, . . . They are only boyled in fair water and a little salt, and afterwards stewed with some butter, a little vinegar and pepper being put into them, and so eaten . . . The Kidney Beans boyled in water, husk and all, onely the ends cut off, and the string taken away, and stewed with butter, are esteemed more savory meat to many mens palates, than the former, and are a dish more often times at rich mens Tables than at the poor." (32).

—Beans, Scarlet

Phaseolus coccineus L.

Cultivated in 1633 by John Tradescant. “. . . The Scarlet Beane riseth up with sundry branches twining about stakes that are set for it to runne thereon, still turning contrary to the Sunne, having three leaves on a foote stalke, . . . the flowers are for fashion like unto the rest, but are many more set together, and of a most orient scarlet color: the Beanes are larger than the ordinary kinde, and of a deepe purple turning to be blacke when is ripe and drie; . . .” (33).

Beets (22, 32)

Beta vulgaris L.

“. . . The roots of the Roman red Beet being boyled, are eaten of divers while they are hot with a little oyle and vinegar, and is accounted a delicate sallet for the winter; and being cold they are so used and eaten likewise. . . .” (32).

Buckwheat (23)

Fagopyrum esculentum Moench

“. . . it is now generally sowed in most of these Northerne Countries, where for the use and profit is made of it many fields are sowed there with, . . . and will not refuse to grow in an hungry ground, but is held generally to bee as good as a dunging to the ground where on it is sowed, the straw thereof also being turned in thereto . . .” (33).

Cabbage (5, 26, 32, 39)

Brassica oleracea L. var. *capitata* L.

“. . . They are most usually boyled in powdered beef broth until they be tender, and then eaten with much fat put among them . . . In the cold Countries of Russia and Muscovia, they powder up a number of Cabbages, which serve them, especially the poorer sort, for their most Ordinary food in winter; and although they stink most grievously, yet to them they are accounted good meat . . .” (32). “. . . The Savoy Cabbage, one is of a deeper green coloured-leaf, and curled when it is to be gathered . . .” (32).

Carrot (5, 22, 32, 34, 39)

Daucus carota L.

“. . . The carrot hath many winged leaves . . . of a deep green colour, some where of in autumn will turn to be of a fine red or purple (the beauty whereof allureth many Gentlewomen oftentimes to gather the leaves, and stick them in their hats or heads, or pin them on their arms instead of feathers . . .)” (32).

Cauliflower (34), Cole-flower

Brassica oleracea L. var. *botrytis* L.

“. . . The Cole-flower is a kind of Cole-wort, whose leaves are large, and like the cabbage leaves, but somewhat smaller, and indented about the edges, in the middle whereof, sometimes in the beginning of Autumn, and sometimes much sooner, there appeareth a hard head of whitish yellow tufts of flowers, closely thrust together, but never open, nor spreading much with us, which then is fittest to be used, . . . this hath a much

pleasanter taste than either the Cole-wort, or cabbage of any kind, and is therefore of the more regard and respect at good mens tables" (32).

Corn (5, 39)

Triticum sp.

One of the most confusing common names in English is "corn". In Britain, and in colonial times in America, the name was a general term for Field grains, most generally wheat. *Zea maize* in the time of Parkinson was Indian or Turkie Wheat, or Maiz.

Cucumber, "Cowcumbers"

Cucumis sativus L.

(5, 21, 22, 32, 34, 39)

Cultivated in the time of Gerarde, 1566. ". . . Some used to cast a little salt on their sliced Cowcumbers, and let them stand half an hour or more in a dish, and then powr away the water that cometh from them by the salt, and after put vinegar, oyl, etc. thereon, as every one liketh . . ." (32).

Dandelion (22)

Taraxacum officinale Weber

". . . There are four or five Species of this Genus, which grow naturally in the Fields, so are not cultivated in Gardens; but some People in the Spring gather the Roots out of the Fields, and blanch them in their Gardens for a Sallad Herb; however, as they are not cultivated, I shall forbear saying any Thing more of them, than that they are very bad Weeds both in Gardens and Fields, so should be rooted out before their Seeds are ripe, . . ." (30). ". . . Early in the spring, whilst the leaves are hardly unfolded, they are no bad ingredients in salads. The French eat the roots, and the leaves blanched, with bread and butter. Its diuretic effects have given it a vulgar name, not only in England, but other European nations. . . ." (31). ". . . it wonderfully openeth the uritoric parts, causing abundance of urine, not only in children whose meseraical veins are not sufficiently strong to containe the quantitie of urine drawne in the night, but that then without restraint or keeping it backe they water their beds, but in those of old age also upon the stopping or yeelding small quantitie of urine, . . ." (33).*

Endive (5, 26, 32)

Cichorium endivia L.

Cultivated in 1562. ". . . Endive being whited . . . usually being buried a while in sand, . . . is much used in winter as a sallat herb, with great delight; . . ." (32).

* It is at least of interest to realize the bed-wetting was a problem in the time of the Pilgrims! It is also amusing to contemplate the reticence of botanical writers. I was curious about the "vulgar name", but found floras in English silent on the subject of other common names for Dandelion though Fernald does record the French-Canadian "Pissenlit". In a Dutch compendium of common names for plants in European languages I found that it was (or is) "Piss i' bed", or "Piss th' Bed". I was even more amused to find that our Horticultural Secretary, Mrs. Walsh, could confirm that her father, who was born in Scotland, had used this name when she was a child.

—Succory, Chicory (32).

Cichorium intybus L.

“ . . . Although Succorie be somewhat more bitter in taste than the Endives, yet it is often times, and of many eaten green, but more usually being buried a while in sand, that it may grow white, which causeth it to lose both some part of the bitterness, or also to the more tender in the eating; . . . ” (32).

Garlic (5, 32, 34)

Allium sativum L.

“ . . . It being well boyled in salt broth, is often eaten of them that have strong stomachs, but will not brook in a weak and tender stomach . . . ” (32).

Gourds (35) see also Melon,

Cucurbita lagenaria L.

Pumpkin, and Squash

Lagenaria vulgaris Ser.

“ . . . fruit shaped like a bottle, with a large roundish belly and a neck, very smooth, when ripe of a pale yellow colour, some near six feet long, and eighteen inches round; the rind becomes hard, and being dried, contains water . . . The Arabians call the bottle Gourd *Charrah*. The poor people eat it boiled, with vinegar; or fill the shell with rice and meat, and thus making a kind of pudding of it. . . . ” (31).

Hemp (39)

Cannabis sativa L.

“The Manured Hempe (which is of so great use, both for linnen cloath and cordage) is as I sayd of two sorts, male and female . . . to shew you the manner of steeping, drying, beating, and clensing hereof, to be made into cloth or cordage, is not my purpose or pertenant for this work; besides that, it would take up too much roome and time; it is familiarly known to every country housewife almost . . . ” (33).

Hops (34, 39)

Humulus lupulus L.

“The young shoots are eaten early in the spring as asparagus, . . . The herb will dye wool yellow. From the stalks a strong cloth is made in Sweden . . . ” (31). “ . . . The ale which our forefathers were accustomed onely to drinke, being a kinde of thicker drinke than beere (caused a stranger to say of it . . . there is no drinke thicker that is drunke, there is no Urine cleerer that is made from it, it must needes be therefore that it leaveth much behind it in the belly) is now almost quite left off to be made, the use of Hoppes to be put therein, altering the quality thereof, to be much more healthfull, or rather physicall, to preserve the body from the repletion of grosse humors, which the Ale engendered . . . ” (33).

Indian or Turkie Corne, Maize (33).

Zea mays L.

Cultivated in England in 1562. “ . . . is cultivated in North America and Germany . . . The most common colour is a yellowish white; but there are some with deep yellow, others with purple, and some with blue grains; in Italy, Germany, and North America it is the food of the poor inhabitants. The Corn is ground to flour, and the poorest sort of people in America . . . make their bread of this flour; . . . this grain seldom



agrees with those who have not been accustomed to eat it; however, in times of scarcity of other grain, this would be a better substitute for the poor than Bean flour . . ." (31).

Leeks (26, 32, 35)

Allium porrum L.

Cultivated by Gerarde in 1596. ". . . The old world, as we find in Scripture, in the time of the children of *Israel's* being in Egypt, and no doubt long before, fed much upon Leeks, Onions and Garlick boyled with flesh; and the antiquity of the Gentiles relate the same manner of feeding on them, to be in all countries the like, which howsoever our dainty age now refuseth wholly in all sorts except the poorest; . . ." (32).

Lettuce (5, 21, 32, 34)

Lactuca sativa L.

Mentioned by Turner in 1562. ". . . All sorts of Lettice are spent in Sallets, with oyl and vinegar, or as everyone please, for the most part, while they are fresh and green, or whited, as is declared in some of the sortes before, to cause them to eat the more delicate and tender. They are also boyled, to serve for many sorts of dishes of meat, as the Cooks know best . . ." (32).

Melon (5, 24) Citrall or

Citrullus lanatus

Turkie Melon, Watermelon

(Thunberg) Mansfield

Cultivated in 1597 by Gerarde. ". . . This fruit should be eaten by Europeans with great caution; when taken in the heat of the day, whilst the body is warm, colics and other bad consequences often insue; and it is well known that persons are much troubled with worms, at the time this fruit is in season . . ." (31).

—Musk Melon (22, 32, 34, 39)

Cucumis melo L.

"They have been formerly only eaten by great personages, because the fruit was not only delicate but rare; and therefore divers were brought from *France*, and since were nursed up by the Kings or Noblemens Gardiners only, to serve for their Masters delight; but now divers others that have skill and conveniency of ground for them, do plant them and make them more common" (32).

Oats (22, 39)

Avena sativa L.

"The meal of this grain makes tolerable good bread, and is the common food of the country people in the north [of Britain]. In the south it is esteemed for pottage, and other messes, and in some places they make beer with it." (31).

Onion (5, 15, 26, 34, 39)

Allium cepa L.

". . . Onions are used many wayes, as sliced and put into pottage, or boyled and peeled and laid in dishes for sallets at supper, or sliced and put into water, for a sawce for Mutton or Oysters, or into meat roasted being stuffed with Parsley, and so many ways that I cannot recount them, . . ." (32).



Parsley (5, 22, 26, 32, 39)

Petroselinum crispum (Miller)

Nym.

"Parsley is much used in all sorts of meats, being boyled, roasted, fryed, stewed, and being green, it serveth to lay upon sundry meats, as also to draw meat withall . . ." (32).

Parsnip (5, 22, 32, 34)

Pastinaca sativa L.

"The Parsnep root is a great nourisher, and is much more used in this time of *Lent*, being boyled and stewed with butter, than in any other time of the year; yet it is very good all the winter long. . . ." (32).

Peas (5, 22, 32, 34, 39)

Pisum sativum L.

"Pease of all or the most of these sorts, are either used when they are green, and be a dish of meat for the table of the rich as well as the poor, yet every one observing his time, and the kind: the fairest, sweetest, youngest, and earliest, for the better sort, the later and meaner kind for the meaner, who do not give the dearest price: or Being dry, they serve to boyl into a kind of broth or pottage, wherein many do put Tyme, Mints, Savory, or some other such hot herbs, to give it the better rellish, and is much used in Town and Country in the Lent time . . ." (32).

Pumpkins (5, 32, 39) Pompions

Cucurbita pepo L.

Cultivated before 1570 according to L'Obel. ". . . They use likewise to take out the inner watery substance with the seeds, and fill up the place with Pippins [apples], and having laid on the cover which they cut off from the top, to take out the pulp, they bake them together, and the poor of the City, as well as of the Country people, do eat thereof as of a dainty dish . . ." (32).

Potato (5, 32, 39)

Solanum tuberosum L.

These and the sweet potato *Ipomoea batatas* are much confused in early accounts, however they seem to have been cultivated in Virginia in 1609. They are said to have been introduced into Ireland either in 1565 by Hawkins or 1584 by Sir Walter Raleigh. Gerarde had the potato in his garden in London in 1597. ". . . Potatoes are said to have been introduced into New England by a colony of Presbyterian Irish who settled in Londonderry, New Hampshire, in 1719, but cultivation did not become general for many years . . ." (20).

Radish (5, 22, 32, 34, 39)

Raphanus sativus L.

"Raddishes do serve usually as a stimulum before meat, giving an appetite there unto; the poor eat them alone with bread and salt . . ." (32).

Rampion (32)

Campanula rapunculus L.

Cultivated by Gerarde in 1596. Native in Europe from the Netherlands southwards. ". . . The fleshy roots are eatable, and are much cultivated in France for salads. Some years past it was cultivated in English gardens for the same purpose, but



is now generally neglected . . . The roots are eaten not only raw in salads, but boiled like Asparagus. They were boiled tender, and eaten cold with vinegar and pepper in the time of Parkinson . . ." (31).

Rye (22, 39)

Secale cereale L.

"Rye is of a more clammy substance than Wheate, and neither is digested so quickly, nor nourished so well, yet is accounted to be next in goodnesse unto Wheate, especially if the corne [grain] be sweet and good, and the bread well fermented and baked, . . ." (33).

Spinach (5, 32) Spinage

Spinacia oleracea L.

"Spinage is an herb fit for sallets, and for divers other purposes for the table only; for it is not known to be used physically at all. . . ." (32).

Squash (39), Summer Squash

Cucurbita pepo L. var.
melopepa (L.) Alef.

"The word 'squash' seems to have been derived from the American aborigines and in particular from those tribes occupying the northeastern Atlantic Coast . . . The distinctions between the various forms of cucurbits seem to have been kept in mind by the vernacular writers, who did not use the words pompion [pumpkin] and gourd, as synonyms . . . The word 'squash' in its early use, we may conclude, applied to those varieties of cucurbits which furnish a summer vegetable and was carefully distinguished from the pumpkin . . . At the present time, the word squash is used only in America, gourds, pumpkins, and marrows being the equivalent English names, and the American use of the word is so confusing that it can only be defined as applying to those varieties of cucurbits which are grown in gardens for table use; the word pumpkin applies to those varieties grown in fields for stock purposes; and the word gourd to those ornamental forms with a woody rind and bitter flesh, or to the *Lagenaria* . . ." (20).

Succory, See Endive

Turnip (22, 26, 32, 39)

Brassica rapa L.

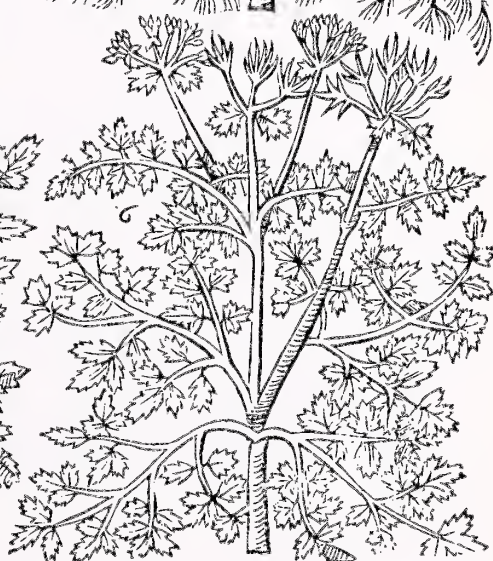
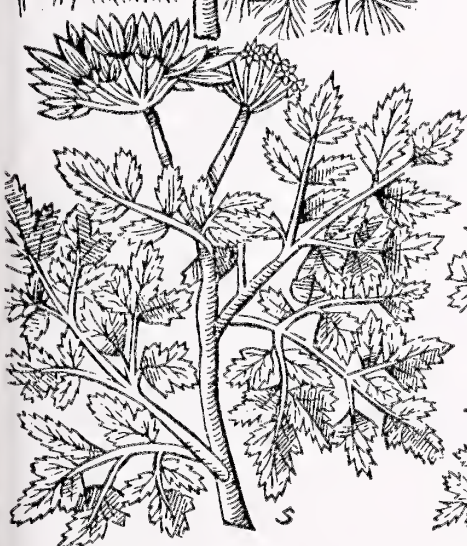
"Being boyled in salt broth, they all of them eat most kindly, and by reason of their sweetness are much esteemed, and often seen as a dish at good men's tables: but the greater quantity of them are spent at poor men's feasts. . . ." (32). Turnips are said to have been introduced into England from Holland in 1550. They were reported to be in cultivation in Massachusetts in 1629.

Wheat (22, 39)

Triticum aestivum L.

Wheat was an unimportant grain in England as late as the reign of the first Elizabeth. It was ordered, from England, by the Plymouth Colony in 1629. By that time it seems to have been widely grown in England in many varieties.

No. 1 *Petroselinum hortense*. No. 2 *Apium graveolens*. No. 3 *Foeniculum vulgare*. No. 4 *Anethum graveolens*. No. 5 *Myrrhis odorata*. No. *Anthriscus cerefolium*. From *Paradisi in Sole* by John Parkinson. London, 1629.



IV Shrubs, Trees and Vines Before 1700

Althea, Shrub Mallow (22, 35)

Hibiscus syriacus L.*Hibiscus mutabilis* L.

Parkinson illustrates (but does not discuss) an *Althea frutex* which seems to be *Hibiscus syriacus*. His *Althea arborescens Provincialis* seems to be *Hibiscus mutabilis* and his *Althea frutex flore albo vel purpureo* seems to be a mixture of the two species.

Arbor-Judae (35), Judas Tree (25, 43), Sallad Tree (23)

Cercis siliquastrum L.possibly also *Cercis canadensis* L.

" . . . The wood of the Tree is very beautifully veined with black and green, and takes a fine polish . . ." (30). Miller, in 1759, says of *C. siliquastrum*, " . . . The pods are gathered and used with other raw vegetables by the Greeks and Turks in salads, to which they give an agreeable odor and taste. The flowers are also made into fritters with batter and the flower-buds are pickled in vinegar" (20). Of *Cercis canadensis* Sturtevant says " . . . The French Canadians use the flowers in salads and pickles . . . "

Arborvitae (21, 23, 32, 35)

Thuja occidentalis L.

"Being reckoned the most durable wood in Canada, inclosures of all kinds are scarcely made with any other wood; especially the posts which are driven into the ground. The palisades round the forts are made of this wood . . . Clusius says that he first saw this tree in the Royal Garden at Fontainebleau, whither it was sent from Canada as a present to Francis the First . . ." (31).

Bayberry, Wax Myrtle (23, 43, 4)

Myrica cerifera L.*Myrica pensylvanica* Loisel.

Newfoundland to North Carolina. *Myrica cerifera* is found from Delaware to Florida and *M. pensylvanica* from Newfoundland to North Carolina. " . . . Candles of this kind do not easily bend or melt in summer, as common candles do; they burn better and slower, nor do they cause any smoak . . . A soap is made in which has an agreeable scent, and is excellent for shaving . . ." (31).

Bladder-nut (35)

Staphylea pinnata L.

" . . . The Nuts are in loathsome and overturning their stomakes that eat them, although Scaliger commendeth them . . . , but wee will give him leave to please his palate, and stomacke with them, and will not envy the good he shall get by them, we never yet could learne that they were accepted among our people, except with some strong clownish stomacke, which can almost digest an horse naile . . ." (33).

Box, English (32, 34, 35)

Buxus sempervirens L.

"The Boxe tree . . . is found with us in many woods, and wood grounds among other sorts of trees, it is also planted in divers Orchards or house backe sides, where it never groweth high, but serveth as a bush to dry Linnen on . . ." (33).

"It was second to the Yew with us in former times for the purpose of being clipped into the shape of animals . . . The branches were in request among our ancestors for decking up houses; they are still seen among other evergreens in churches at Christmas, and in some countries they are borne by attendants at funerals . . ." (31).

" . . . The low or dwarf Box is of excellent use to border up a knot or the long beds in a Garden, being a marvelous fine ornament thereunto, in regard it groweth low, is ever green, and by cutting may be kept in what manner every one please, . . ." (32).

Cherry, Wild or Choke (43)

Prunus virginiana L.

"Wood, in his New England Prospects, mentions choke cherries and says they are very austere and as yet "as wilde as Indians." . . . (20).

Cytissus, Spanish (21, 32), Spanish Broom *Spartium junceum*

" . . . They groweth naturally in many places of France, Spain and Italy, we have it as an ornament in our Gardens, among other delightful plants, to please the senses of sight and smelling . . ." (32). " . . . It appears from Turner's Herbal that it was cultivated here in 1562 by Lord Cobham . . ." (31).

Dogwood, Flowering (43)

Cornus florida L.

Native in North America. " . . . There is a variety of it with a rose-coloured involucre, which was found wild in Virginia by Banister, and afterwards by Catesby . . ." (31). Introduced into England in 1739 by Philip Miller or perhaps earlier by Fairchild. Cultivated in Virginia between 1712 and 1719.

—Cornelian Cherry, Cornel (24, 25, 32, 40) *Cornus mas* L.

" . . . by reason of the pleasantnesse in them when they are ripe, they are much desired . . . They are also preserved and eaten . . ." (32). " . . . Formerly it was cultivated for the fruit, which was used to make tarts, and a rob de Cornis was kept in the shops . . ." (31).

—Red Osier (43)

Cornus stolonifera Michx.

—Silky Dogwood (43)

Cornus amomum Miller

Both valued for the red winter color of the young shoots.

Fir (32, 35)

Picea abies L. Karsten

" . . . The Firre tree groweth naturally higher than any other tree in these parts in Christendom where no Cedars grow, and even equalling or over-topping the Pine . . . "

Gelder or Guelder Rose (21, 32, 34) *Viburnum opulus* L. var.
roseum L.

The sterile form “. . . is generally called *Sambucus rosea*:
 In English, The Elder Rose, and more commonly after the
 Dutch name, the Gelder Rose. . . .” (32).

Hackberry, Common (43) *Celtis occidentalis* L.

Hemlock (22) *Tsuga canadensis* L. Carr.

Honeysuckle, French, Red-satin Flowers (21, 32)
Lonicera periclymenum L.
L. caprifolium L.

—Honeysuckle, Coral (43) *Lonicera sempervirens* L.

Hypericum, St. John's Wort (21) *Hypericum perforatum* L.

“The common people in France and Germany gather it with
 great ceremony on St. John's day, and hang it in their windows,
 as a charm against storms, thunder, and evil spirits; mistaking
 the meaning of some medical writers, who have fancifully given
 this plant the name of *Fuga Daemonum*, from a supposition
 that it was good in maniacal and hypochondracal disorders
 . . .” (31).

Jasmine *Jasminum officinale* L.

“. . . Gerard cultivated this shrub in 1597. He says it was
 then common in most parts of England, being used for arbors
 and to cover banqueting houses in gardens . . .” (31).

—Jasmine, Carolina (40, 43) *Gelsemium sempervirens* L.
 Aiton fil.

“. . . groweth in Virginia as Master *Tradescant*, who saw it
 there doth affirme, and from him I have a plant risen of the
 seed. [It] was never mentioned by any before, and but that
 Master *Tradescant* is confident to call it a Jasmine, and there-
 fore I am content to put it with the rest to give him content,
 I would be further informed of it my selfe, before I would
 certainly give it my consent . . .” (33).

Juniper, Savin — see Savin tree or bush

Juniper, Red Cedar (23, 24, 43) *Juniperus virginiana* L.

“. . . this tree is much used for wanescotting rooms, making
 escritoirs, cabinets, etc., cockroches and other insects disliking
 the smell of it . . .” (31).

Laburnum (17, 19) *Laburnum anagyroides* Medic.

“. . . There is no use hereof in Physick with us, nor in the
 natural place of the growing, save only to provoke a vomit,
 which it will do very strongly . . .” (32).

Lantana (26)

Lantana camara L.

Cultivated probably for summer bedding. It was cultivated in 1691 in the royal garden at Hampton Court. (31).

Larch (32, 35)

Larix decidua, Miller

" . . . The coles of the wood hereof (because it is so hard and durable as none more) is held to be of most force being fined, to cause the iron oare to melt, which none other would do so well . . ." (32).

Lilac, Pipe tree — see *Syringa*

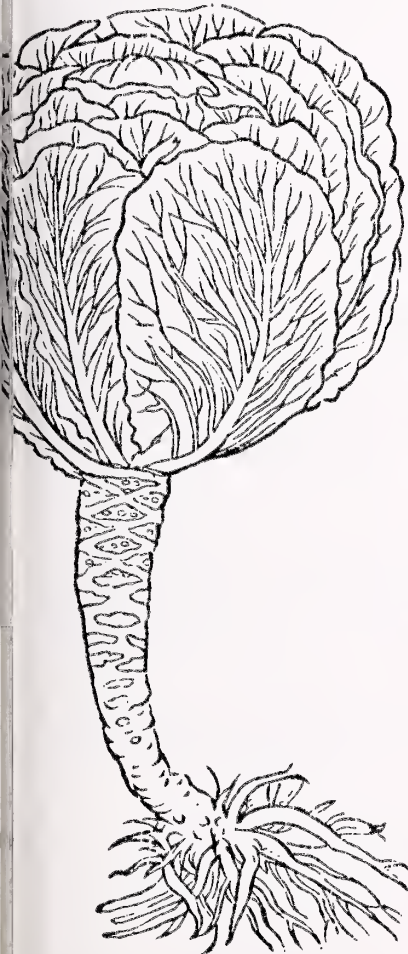
Linden, Lime (17)

Tilia europaea L.

Although a hybrid, it does produce some viable seed. Cultivated at least as early as 1562. " . . . The coles of the wood are the best to make gunpowder and being handled, and quenched in vinegar, are good to dissolve clotted blood in those that are bruised with a fall . . ." (32).

Brassica Tritiana, siue *Capitata*.

Brassica Pompeiana, aut *Cypria*.



. . . "The most elegant use to which it is applied is for carving. Many of Gibbons's beautiful works in Lime tree are dispersed about the kingdom in our churches and palaces; . . ." (31).

Locust (40, 43)

Robinia pseudo-acacia L.

" . . . Native of North America, where it grows to a very large size, and the wood is much valued for its duration. Most of the houses which were built at Boston in New England, on the first settling of the English, were constructed of this timber . . ." (31).

Magnolia, Sweetbay (23, 24, 43)

Magnolia virginiana L.

" . . . in American this tree is known by the names of *White Laurel*, Swamp Sassafras, and Beaver Tree. It has the last name, because the root is eaten as a great dainty by Beavers; and this animal is caught by means of it . . ." (31).

Maple, Red (43)

Acer rubrum L.

" . . . This sort was cultivated in 1656 by Mr. John Tradescant, jun. . . . It is propagated with us for the sake of the scarlet flowers, which come out early in the spring. In Pennsylvania, where it grows in the swamps, the natives use it for almost all sorts of wood-work; with the bark they dye a dark blue, and make a good black ink . . ." (31).

Mezereum (Chamelaea) (21, 23, 24, 32) *Daphne mezereum* L.

Gerarde cultivated it in 1596. " . . . The branches make a good yellow dye . . . The berries when swallowed prove a powerful poison . . . There are two principal varieties of the Mezereum; one with a white flower succeeded by yellow berries; the other with peach-coloured flowers and red fruit; the latter has sometimes flowers of a much deeper red. There is also a variety with variegated leaves . . ." (31).

Mock Orange

Philadelphus coronarius L.

Lilacs, Mock Oranges, and some Jasmynes were confused at this period. Mock Orange was *Syringa flore albo simplici* (*Syringa* with single white flowers), the single white pipe-tree. The double white pipe-tree or *Syringa Arabica flore albo duplici* (*Syringa* of Arabia with double flowers) is *Jasminum sambac* the Arabian Jasmine. The Lilacs were called *Lilac sive syringa* . . . Mock Orange was cultivated by Gerarde in 1596.

Oak, White (25)

Quercus alba L.

" . . . Acorns were dried and boiled for food by the Narragansetts. Oak acorns were mixed with their pottage by the Indians of Massachusetts. Baskets full of parched acorns, hid in the ground, were discovered by the Pilgrims December 7, 1620 . . ." (20).

It was not cultivated in England until 1724.

Oak, Red (23, 25)

Quercus borealis Michx. fl.

" . . . The red oak is of little value for fuel or for most pur-

poses as timber . . . But, like some individuals in a higher field in creation, it compensates in some measure for its comparative uselessness, by its great beauty . . ." Emerson, G. B., Trees and Shrubs of Massachusetts.

Oak, Scarlet (43)

Quercus coccinea Muench.

Periploca (32)

Asclepias syriaca L.

Virginia silk (17) Wisanck Milkweed, ". . . I know not of any in our Land hath made any tryall of the properties hereof. Captain John Smith in his book of the discovery and description of Virginia, saith, that the Virginians use the roots hereof . . . being bruised and applied to cure their hurts and diseases." (32).

Philadelphus — see Mock Orange

Pine (17)

Pinus sp.

It is likely that individual trees of various species were allowed to persist around the homesteads and in pastures.

Pipe tree — See Syringa, Mock Orange, or Jasmine

Poplar (34)

Populus alba or
P. nigra

Both species were used at this period for timber.

Privet (25, 32)

Ligustrum vulgare L. and
var. *italicum* (Miller) Vahl

". . . In point of utility and ornament few shrubs exceed the common privet. Its chief use is to form such hedges as are required in dividing gardens for shelter or ornament, and for this the Italian or Evergreen Privet is usually preferred. It is one of the few plants that will thrive in the smoke of London . . ." (31).

Pyracantha (32, 35)

Pyracantha sp.

Cultivated by Parkinson in 1629. ". . . it is preferred with divers as an ornament to a garden or orchard, by reason of his ever green leaves, and red berries among them . . ." (32).

Red-bud — see Arbor-Judae

Rose (32, 42)

Rosa sp. & cvs.

Many roses were cultivated, too many to deal with here. The reader should refer to Rose of Sharon — see Althea.

Saint John's Wort — see Hypericum

Sassafras (25, 43)

Sassafras albidum (Nutt.)
Nees.

". . . A decoction of Sassafras with sugar was sold in coffee-houses at the end of the last century, under the name of Bochet . . ." (31).

Savin Tree or Bush, Savine (32) *Juniperus sabina* L.

Cultivated in 1562 according to Turner . . . "It is planted in out-yeards, bush-sides or void places of Orchards, as well, to cast cloaths thereon to dry, as for medicines both for men and horses: being made with an oyle, it is good to annoint children's bellies for to kill the worms . . ." (32).

Service Tree or Sorbus (32, 35) *Sorbus torminalis* Crantz

". . . the fruit of this tree is in some round like an apple, and in others a little longer like a pear, but of a more pleasant taste than the ordinary kind, when they are ripe and mellowed, as they used to do both with these kinds and with Medlars . . ." (32).

Smoke Tree, Venice sumacke *Cotinus coggygia* Scopoli

". . . The wood is yellowish, and serveth to give a yellow dye: but the leaves and young branches, doe Dye a blacke colour; and with the barke they Tanne leather . . ." (33).

Spicebush (43) *Lindera Benzoin* Blume

"Native of Virginia; whence it was sent by Banister to Compton Bishop of London, and cultivated in his garden at Fulham in 1688 . . ." (31).

Spiraea (21, 35), Spiraea Frutex *Spiraea salicifolia* L.

"It appears from Rea's Flora that the common Spiraea Frutex was cultivated here in 1665 . . ." (31).

Sweet Gum (43) *Liquidambar styraciflua* L.

Cultivated by Bishop Compton in 1688. ". . . from between the wood and the bark issues a fragrant gum, which trickles from the wounded trees, and by the heat of the sun congeals into transparent drops, which the Indians chew as a preservation to their teeth . . . The Bark is also of singular use to the Indians for covering their huts . . ." (31).

Sycamore (43) *Platanus occidentalis* L.

Cultivated in England in 1640 by John Tradescant junior. ". . . the English Americans call it Button-wood . . . or Water Beech . . . It grows mostly in low places. . . . It is easily transplanted to drier places, if the soil be good, . . . it is planted about houses and in gardens to afford a pleasant shade in the hot season . . ." (31).

Syringa, Pipe Tree (see also *Philadelphus*)

"Gerarde and Parkinson cultivated the blue and white Lilac under the name of Pipe Tree or Privets. The former says, 'I have them growing in my garden in great plenty' 1597 — Mattioli's figure [1598?] is engraved from a drawing which was taken from a plant brought over from Constantinople by Augerius de Busbeke, who during seven years was Ambassador to the Sultan Soliman from the Emperor Ferdinand I. . . ." (31).

Syringa, Persian (43)

Syringa persica L.

"It appears from the Catalogue of the Oxford garden that it was cultivated here in 1658 . . ." (31).

Trumpetcreeper (43)

Campsis radicans Seem.

Cultivated in England in 1640. ". . . This never bore flower with mee, nor any other that hath it in our country that I could heare of: but in the naturall place, as also beyond the sea, at Rome, and other warme countries it beareth a great tuft of flowers together . . ." (33).

Tulip tree (43)

Liriodendron tulipifera L.

Cultivated by Bishop Compton at Fulham in 1688.

Virginia creeper (26)

Parthenocissus quinquefolia
(L.) Planch.

Cultivated by Parkinson in 1629.

Witch-hazel (43)

Hamamelis virginiana L.

Native in Eastern North America. Introduced into England by Peter Collinson in 1736.

1 *Syringa alba*.
White Pipe.



2 *Syringa caerulea*.
Blew Pipe.



V Fruits and Nuts Before 1700

Almond (32, 35)

Prunus dulcis (P. Miller)

D. A. Webb

(*P. amygdalus* Batsch.)

Native in western Asia. Phillip Miller knew 3 varieties in 1743, The Common, the Sweet with Tender Shells, and the Bitter.

Apple (5, 8, 34, 35, 39, 42)

Hybrid derivations from

Malus pumila Miller.

Native in Europe and western Asia. Apple seeds were introduced by the first Colonists, and gave rise to "American" cultivars. Although the art of grafting was known, apples were commonly propagated by seed for the next two hundred years. The Hon. Paul Dudley of Roxbury, who was Chief Justice of Massachusetts, published in 1734 a paper in the Philosophical Transactions of the Royal Society of London entitled: "Some Observations on the Plants of New England . . ." in which he comments "Our apples are without doubt as good as those of England, and much fairer to look to; . . . A good apple tree with us will measure from six to ten foot in girt . . ." (13).

Apricot (5, 32, 34, 35) Apricock, Abricot *Prunus armeniaca* L.

Native in western Asia. As late as 1743 there were only about eight varieties of Apricot in cultivation in Great Britain.

Barberry (32, 35)

Berberis vulgaris L.

Native in Europe. ". . . grows naturally in the hedges in many parts of England, but is also cultivated in gardens for its fruit, which is pickled and used for garnishing dishes . . ." (30). "The fruit is used for pickling and for preserving; a decoction of the berries sweetened is deemed useful as well as pleasant in fevers . . ." (30).

Cherries (32, 34, 35, 38, 39) Sour Cherry *Prunus cerasus* L.

Native in southeastern Europe and western Asia. ". . . Francis Higginson writing in 1629, after naming the several other fruits then under cultivation in Massachusetts, notes that the 'Red Kentish' is the only cherry cultivated. . . . As early as 1641, a nursery had been started in Massachusetts and was selling among other trees those of a cherry. . . . These early plantations of cherries in New England were undoubtedly grown from seed; . . . at least, the records make mention of seeds and not of trees . . ." (14).

Currants (32, 35, 39) Ribes

Ribes sylvestre Mert. et Koch

Native in western Europe. "There is little of interest or of profit to the pomologist in the history of the currant in America. The earliest English settlers in Massachusetts, . . . brought

this fruit to the new country. Probably the sorts brought were the Red and White Dutch, and the fact that after those hundred years we still grow these varieties is significant, there have been few attempts to improve the currant in America . . ." (19).

Elderberry (34) Eldern

Sambucus canadensis L.

Native in eastern North America.

S. nigra L.

Native in Europe and western Asia. The berries were used for making wine and pies.

Fig (5, 32, 35, 40)

Ficus carica L.

Native in western Asia. ". . . in 1629 one Mistress Pearce, of Jamestown, an honest, industrious woman, had gathered from her garden in one year 'neere an hundred bushels of excellent Figges' . . ." (19).

Filbert (32, 35, 39) Filbeards

Corylus avellana L.

Native in Europe. P. Miller in 1743 recognized five sorts growing in England. European forms have not done well in this country except in the Northwest.

Gooseberry (5, 32, 34, 35, 39, 42)

Ribes grossularia L.

Native in Europe eastward to the Caucasus. ". . . The Gooseberry of history is well grown only in the Old World. Early settlers in America from England and Holland tried its culture here but the hot dry American summers parched and withered both fruit and foliage. Moreover, it was subject to a native mildew which, before preventive and remedial sprays were introduced, made short work of European Gooseberries in America. A few of the several hundred varieties grown in Europe vicariously grow in favored gardens in northeastern United States and adjacent parts of Canada . . ." (19).

Grapes (34, 35, 39, 42)

Vitis vinifera L.

Probably native in the Caucasus. There were many attempts to grow foreign grapes in New England. John Winthrop, Governor of Massachusetts Bay Colony, had planted a vineyard in one of the islands, known as Governor's Garden, "in Boston Harbor before 1630. Vine-planters were sent to this colony in 1629. There were plantations at the mouth of the Piscataqua in Maine as early or before Winthrop's plantings were made . . . if grapes were grown, or wine made from the foreign grape, no great degree of success was attained. Wine was made in plenty from the wild grapes in all of the New England colonies so that it was not because of Puritanical prejudices against wine that the grapes were not grown . . ." (15).

Hazelnut, Hazel (5, 34) — See Filberts

Hawthorn, Oxycantha

Crataegus oxycanthoides Thuill.

C. monogyna Jacq.

Planted for hedges — a double-flowered cultivar was available for ornamental planting.

Medlar (32, 34, 35)

Mespilus germanica L.

Native from southeastern Europe to Persia. "These fruits are permitted to remain upon the trees till *October*, when they will begin to fall; at which time they must be gathered when dry, and laid by in a dry place, until they become soft, and begin to decay, which is commonly about a Month after they are gathered, when they will be fit to be eaten; before which they are so very harsh, that it is almost impossible to eat them." Miller P., *Gardener's Dictionary* Ed. 4, 1743.

Mulberry (32, 35)

Morus nigra L.

" . . . is very common in most gardens, being raised for the Delicacy of its fruit . . . *Morus alba* L. is commonly cultivated for its leaves to feed silk-worms . . ." (30).

Nectarine (5, 32, 34, 35, 39)

Prunus persica (L.)

Batsch. var.

nectarina (Aiton) Maxim.

" . . . they have been with us not many years. . . . we at this day doe know five several sorts . . ." (32).

Orange, (32) Seville or Sour Orange

Citrus aurantium L.

Native in southern Asia. First plantings in South Carolina made before 1577. It is well known that oranges in small quantities have been grown for many years in South Carolina and Georgia, particularly on certain islands adjacent to the coast. It is therefore interesting to know that Bartholomé Martínez in a letter to the King dated at Havana, February 17, 1577, stated: 'And what may be truthfully told to your Majesty is that in Santa Elena [Parris Island, South Carolina] I planted with my own hands grape vines, pomegranate trees, orange and fig trees; wheat, barley, onions, and garlic.' Martínez had lived in Santa Elena until 1576. His garden therefore was planted before 1577, the date of his statement.

It is clear from this evidence that citrus fruits were introduced into several sections of the southeastern United States in the latter part of the sixteenth century. (Webber, H. J. & Batchelor, L. D. *The Citrus Industry*).

Peach (8, 32, 34, 35, 39)

Prunus persica L.

"Of peaches in the New England colonies, we need say but little. Except in favored parts of Connecticut and Massachusetts, this fruit was little grown in these northern colonies. It is not at all probable that New England Indians ever planted peaches and for a generation after the whites came the struggle for the necessities of life kept them from indulging in so great a luxury as a peach-orchard. Strong drink was commonly used by the Puritans as by the Churchmen in Virginia and peach-brandy would have been as acceptable but it was easier to produce cider, and rum from the West Indies could be had with little trouble. Still, peaches were sparingly grown in the New England colonies.

"The Massachusetts Company in 1629 sent peach-pits, along

with seeds of other fruits, to be planted by the colonists. Twelve years later George Fenwick, Saybrook, Connecticut, writes to Governor Winthrop that he is 'prettie well storred with chirrie & peach trees'. Justice Paul Dudley, who seems to have been the leading horticulturist in Massachusetts in his time, writes in 1726: 'Our Peaches do rather excel those of England, and then we have not the Trouble or Expence of Walls for them; for our Peach Trees are all standards and I have had in my own Garden seven or eight Hundred fine Peaches of the Rare-ripes, growing at a Time on one Tree.' From another statement made by Justice Dudley we learn that peaches were still being grown from the stone and may assume that budding was not known, or so careful a horticulturist as our author would have mentioned it. He says: 'Our Peach Trees are large and fruitful, and bear commonly in three Years from the Stone. I have one in my Garden of twelve years growth, that measures two Foot and an Inch in Girt a Yard from the ground which, two Years ago, bore me near a Bushel of fine Peaches.' (16).

"In the voyages undertaken for exploration and commerce soon after the discovery of America by Columbus the peach was introduced in America by the Spanish; for soon after permanent settlement had been made in the South the settlers found this fruit in widespread cultivation by the Indians and its origin could only be traced to the Spaniards who early visited Florida and the Gulf region. William Penn wrote as early as 1683 that there were very good peaches in Pennsylvania; 'not an Indian plantation was without them.' The abundance of this fruit was noted by all the early travelers in the region from Pennsylvania southward and westward . . ." (18).

Pear (5, 8, 32, 34, 35, 39), Peare *Pyrus communis* L.

Native in Europe and western Asia. "He [Justice Dudley] says: An *Orange* Pear Tree grows the largest and yield the fairest Fruit. I know one of them near forty Foot high, that measures six Foot and six Inches in Girt, a Yard from the Ground, and has borne thirty Bushels at a Time: and this year I measured an *Orange* Pear, that grew in my own Orchard, of eleven Inches round the Bulge. I have a *Warden* Pear Tree, that measures five Foot six Inches round. One of my Neighbors has a *Bergamot* Pear Tree that was brought from England in a Box, about the Year 1643, that now measures six Foot about, and has borne twenty-two Bushels of fine Pears in one Year. About twenty years since, the Owner took a *Cyon*, and grafted it upon a common *Hedge* Pear; but the Fruit does not prove altogether so good, and the Rind or Skin, is thicker than that of the Original." (17).

Plum (5, 8, 32, 34, 35, 39, 42) *Prunus domestica* L.

Native in Europe and western Asia. "In Massachusetts some plums were planted by the Pilgrims, for Francis Higginson, writing in 1629, says: 'Our Governor hath already planted a vineyard with great hope of increase. Also mulberries, plums, raspberries, corrance, chestnuts, filberts, walnuts, smalnuts, hurtleberries.' The plums were Damsons, as a statement is made a little later that the 'Red Kentish is the only cherry and

the Damson the only plum cultivated.' A further reference to this plum is made by John Josselyn, when, writing of a voyage to New England in 1663, he says, "The Quinces, Cherries, Damsons, set the dames a work, marmalad and preserved Damsons is to be met with in every house." (18).

"In 1797 there is the following concise account of the plums cultivated in New England.

"The better sorts which are cultivated are the horse plum, a very pleasant tasted fruit, of large size; the peach plum, red toward the sun, with an agreeable tartness; the pear plum, so-called from its shape, which is sweet, and of an excellent taste; the wheat plum, extremely sweet, oval, and furrowed in the middle, not large; the green-gage plum, which is generally preferred before all the rest.' . . ." (18).

Pomegranate (5, 39)

Punica granatum L.

Native from southeastern Europe to the Himalayas. Pomegranates do not survive outdoors north of Washington. The First greenhouse in New England seems to have been that of Andrew Faneuil in the early 1700's, so it is unlikely that any planting of pomegranate in this area before that was successful. However, two or three varieties were known in England, so it is likely that some colonists may have tried to raise plants from seed.

Quince (5, 10, 34, 35, 39)

Cydonia oblonga Miller

Native in central Asia. ". . . Our fruit-trees prosper abundantly, Apple-trees, Pear-trees, Quince-trees, Cherry-trees, Plum-trees, Barberry-trees. I have observed with admiration that the Kernels sown or succors planted produce as fair and good fruit without grafting as the Tree from whence they were taken . . ." (22).

Raspberries (32, 39)

Rubus idaeus L.

Native through much of the North Temperate Zone. ". . . The Raspis berries is of two sorts, white and red, not differing in the form either of bush, leafe or berry, but onely in the colour and taste of the fruit . . ." (32).

Strawberries (5, 26, 32, 39, 42)

Fragaria virginiana

Duchesne

The common native strawberry was mentioned by the early European explorers and pioneers on our Atlantic seaboard. (19).

Fragaria chiloensis, one of the parents of the modern cultivated strawberries did not arrive in Europe from Chile until 1712.

Walnuts (32)

Juglans regia L.

Native from southeastern Europe to China. ". . . as there do not perhaps exist . . . , south of the Hudson river, ten European Walnut trees . . ." *Juglans nigra* L. ". . . These nuts are sold in the Markets of New York, Philadelphia, and Baltimore, and served upon the tables." Hillhouse, S. L. (Trans.) Michaux, F. A. *The North American Sylva*. 3 vols. Paris. C. D'Hautel. 1819.

VI Flowers, 1700 to 1776

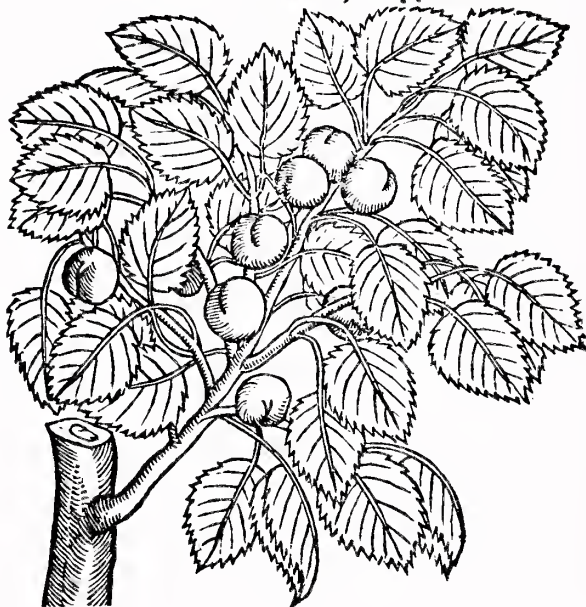
- Aster, China (40) *Callistephus chinensis* (L.)
Nees.
Native in China and Japan. Sent by French missionaries to Paris, grown in England about 1731.
- Aster, Stokes (40) *Stokesia laevis* (Hill) Greene
Native in North America from South Carolina to Louisiana. Introduced to England by James Gordon about 1766.
- Balsam, Double (5) *Impatiens balsamina* L.
Double-flowered forms were not known in 1640 but were so common as not to be of exceptional note in 1759.
- Bearberry (24) *Arctostaphylos uva-ursi* L.
Native in the Northern Hemisphere. Discovered in Britain before 1700 and noted in America by Kalm in 1750.
- Bedstraw, Yellow (23) *Galium varum* L.
Native throughout Europe. Cultivated in England in 1597.
- Bee Balm (23, 40) *Monarda didyma* L.
Native from New York to Michigan, south to Georgia and Tennessee. Cultivated in England by Peter Collinson in 1755.
- Bent Grass (24) *Agrostis tenuis* Sibthorp
(and perhaps other species)
Native in Europe. Long cultivated in pastures.
- Black-eyed Susan (40) *Rudbeckia hirta* L.
Native in North America from western Massachusetts to Illinois south to Georgia and Alabama. Cultivated in Britain in 1732 by James Sherard.
- Bouncing Bet, Soapwort (40) *Saponaria officinalis* L.
Native in Europe. Long cultivated.
- Carnation, Clove Pink (5) *Dianthus caryophyllus* L.
Native in southern Europe. Cultivated in England in 1597.
- Catchfly, Morning Campion, Red Campion (22)
Melandrium rubrum (Weigel)
Garcke (*Lychnis dioica* L.)
Native in Europe, western Asia, and North Africa. Cultivated in Britain in 1633.
- Catchfly (23) *Viscaria vulgaris* Bernh.
(*Lychnis viscaria* L.)
Native in Europe and western Asia. Cultivated in Britain in 1644.

- Cat-tail (23, 46) *Typha latifolia* L.
Widespread in the northern Hemisphere. Long used in rural crafts.
- Cockscomb (5, 40) *Celosia argentea* L. var. *cristata* (L.) Kuntz.
Native in the Asiatic tropics. Cultivated in Britain in 1597.
- Columbine (40) *Aquilegia canadensis* L.
Native in North America from Newfoundland to Wisconsin south to Georgia and Tennessee. Cultivated in England before 1640 by John Tradescant, Senior.
- Coreopsis, Tickseed (40) *Coreopsis lanceolata* L.
Native in North America from Virginia to Wisconsin, south to Florida and New Mexico. Cultivated in Britain in 1725.
- Creeping Jenny, Creeping Charley, Moneywort (40) *Lysimachia nummularia* L.
Native in Europe and western Asia. Cultivated in England in 1597.
- Evening Primrose (24) *Oenothera biennis* L.
Native throughout the United States. Originally cultivated at Padua in 1619, and in England in 1629.
- Fall Daffodil (40) *Sternbergia lutea* (L.) J. A. and J. H. Schult.
Native in southern Europe. Cultivated in England in 1597.
- Foamflower (40) *Tiarella cordifolia* L.
Native from New Brunswick to Michigan, south to North Carolina and Tennessee. Cultivated in Britain in 1731.
- Galax (40) *Galax aphylla* L.
Native from Virginia and West Virginia, south to Georgia and Alabama. Cultivated in Britain in 1751.
- Golden Ragwort (40) *Senecio aureus* L.
Native from Maryland to Missouri, south to Florida and Arkansas. Cultivated in England in 1759.
- Hydrangea (40) *Hydrangea arborescens* L.
Native from New York to Missouri, south to Georgia and Oklahoma. Cultivated in England in 1736 by Peter Collinson.
- Inkberry (40) *Ilex glabra* (L.) Gray
Native from Nova Scotia to Florida and Louisiana. Cultivated in Britain in 1759.
- Iris, Dwarf (5) *Iris pumila* L.
Native from central Europe to Asia Minor. Cultivated in Britain in 1596.

- Lizard's Tail (40) *Saururus cernuus* L.
Native from Rhode Island and Quebec to Kansas, south to Florida and Texas. Cultivated in England in 1759.
- Lunaria, Moonwort, Honesty *Lunaria annua* L.
Native in southeastern Europe. Cultivated in Britain in 1596.
- Maidenhair Fern (24) *Adiantum pedatum* L.
Native from Quebec and Minnesota, south to Georgia and Louisiana. Cultivated in England by John Tradescant the younger before 1640.
- Mallow, Rose (40) *Hibiscus moscheutos* L.
Native from Maryland to Indiana, south to Florida and Alabama. Introduced to the Jardin des Plantes in Paris in 1644.
- Meadow Rue (40) *Thalictrum aquilegifolium* L.
Native in Europe and Asia. Cultivated in England in 1731.
- Pea, Beach (23, 24) *Lathyrus japonicus* Willd.
var. *glaber* (Ser.) Fernald
(*Pisum maritimum* L. in part)
Native from Labrador to New Jersey, inland to the Great Lakes.
- Periwinkle (5, 41, 40) *Vinca minor* L.
Native in Europe. Long cultivated.
- Phlox (23, 24) *Phlox paniculata* L.
Native from New York to Iowa, south to Georgia and Arkansas. Cultivated in England in 1732 by James Sherard.
- *Phlox maculata* L.
Native from Quebec to Minnesota, south to Tennessee and Missouri. Cultivated in England in 1759.
- *Phlox carolina* L.
Native from Maryland to Indiana, south to North Carolina and Alabama. Cultivated in Britain before 1728.
- Pinks, Grass (40) *Dianthus plumarius* L.
Native in southeastern Europe. Cultivated in Britain in 1629.
- Poppy, Oriental (40) *Papaver orientale* L.
Native in the eastern Mediterranean region. Cultivated at Paris about 1700 and in England before 1714.
- Poppy, Prickly (5) *Argemone mexicana* L.
Native in the American tropics. Cultivated in Britain in 1592.
- Snowdrop *Galanthus nivalis* L.
Native in central, southern, and eastern Europe. Long cultivated.

- Sweet Pea, Annual (5) *Lathyrus odoratus* L.
Native in Italy. Cultivated in Britain in 1700.
- Trollius (5) *Trollius europeus* L.
Native of Europe. Cultivated in England in 1581.
- Turtlehead *Chelone glabra* L.
Native from Newfoundland to Minnesota, south to Georgia, Alabama and Missouri. Cultivated in Britain in 1730.
- — *Chelone obliqua* L.
Native from Maryland and Tennessee, south to Florida and Mississippi. Cultivated in Britain 1732.
- Veronica (40) *Veronica maritima* L.
Native in central Europe and northern Asia. Cultivated in England by Mr. Hugh Morgan in 1570.
- Virginia Bluebells (5) *Mertensia virginica* (L.) Pers.
Native from New York to Minnesota, south to South Carolina and Arkansas. Cultivated in England in 1699.
- Whitlow Grass (23) *Draba verna* L.
Native in Europe, Asia and North Africa. Long common as a garden weed.

Malus Armeniaca. The Appetok tree.



VII Vegetables, 1700 to 1776

- Broccoli (5) *Brassica oleracea* L. var. *botrytis* L.
Native in Europe. Apparently originating in England (Europe?) sometime after 1680.
- Cayenne Pepper (5) *Capsicum frutescens* L. var. *longum* Bailey
Probably native in tropical America. Cultivated in England in 1656 by John Tradescant, Junior.
- Celery (5) *Apium graveolens* L. var. *dulce* (Miller) Persoon
Native in Europe. Apparently celery was not developed until after 1640.
- Cotton (23) *Gossypium herbaceum* L.
Cultivated in Virginia as early as 1621, but not an important crop until much later.
- Lentils (5) *Lens culinarius* Medic.
Native in southern Europe.
- Okra (23) *Hibiscus esculentus* L.
Native in the Old World Tropics, known in cultivation in Britain in 1692.
- Peas, Black Eyed or Cow Peas (5) *Vigna sinensis* (L.) Savi
Probably native in the Old World Tropics. Introduced in 1776.
- Pepper, Guinea — See Cayenne Pepper (23)
- Pepper Grass, Garden Cress (5) *Lepidium sativum* L.
Native in western Asia. Long cultivated.
- Rape (5) *Brassica napus* L.
Known only in cultivation. Long cultivated.
- Scurvy Grass (5) *Cochlearia officinalis* L.
Native throughout the Arctic and boreal regions. Long known as an antiscorbutic.
- Sorrel, Garden (5) *Rumex acetosa* L.
Native in Europe and America. Long known as a salad herb.
- Vetch, Tares *Vicia sativa* L.
Native in Europe and Asia. Long cultivated as a stock food.
- Yams (23) *Dioscorea alata* L.
Native from India to Malaya. Long cultivated in the tropics.

VIII Shrubs, Trees and Vines, 1700 to 1776

- Acacia, Egyptian (43) *Acacia farnesiana* (L.) Willd.
Probably native in Mexico or the West Indies, but now extensively naturalized in tropical areas. First cultivated in the garden of Cardinal Alessandro Farnese (The Farnese Palace) in 1611.
- Alder (5) *Alnus glutinosa* (L.) Gaertn.
Native in Eurasia.
- Amorpha, Bastard Indigo (5, 10) *Amorpha fruticosa* L.
Native in eastern North America from southern Pennsylvania to Florida, west to Louisiana and Kansas. Sent to England by Mark Catesby in 1724.
- Andromeda (23) *Leucothoe racemosa* (L.) Gray
Native in eastern North America from Massachusetts to Florida. Noted by Peter Kalm in 1750, but previously cultivated by Peter Collinson in England in 1736.
- Aralia or Devil's Walking Stick (43) *Aralia spinosa* L.
Native in North America from New Jersey to Iowa, south to Florida and Texas. Sent by Rev. John Banister from Virginia to Bishop Compton in England and cultivated by him in 1688.
- Arrow-wood (43) *Viburnum dentatum* L.
Native of North America from Massachusetts south to Florida and Texas. Cultivated in England by Peter Collinson in 1736.
- Ash, American or White (10) *Fraxinus americana* L.
Native in North America from Quebec and Minnesota to Florida and Texas. Raised in England from seeds sent from New England in 1724 by Mr. Moore [? Robert More of Shrewsbury?].
- Ash, European (23) *Fraxinus excelsior* L.
Native in Europe. Long cultivated in Britain for timber and fuel.
- Azalea, Flame (40, 43) *Rhododendron* sp.
Azaleas of the section *Pentanthera* which are native in eastern North America seem to have been much confused at this period.
Rhododendron calendulaceum (Michx.) Torr. was the most desired, with its deep red flowers, but *R. periclymenoides* (Michx.) Shinnars (*R. nudiflorum*), *R. prionophyllum* (Small) Millais, (*R. roseum*), *R. canescens* (Michx.) Sweet, and *R. atlanticum* (Ashe) Rehder seem all to have been cultivated. One or more was cultivated in England by Peter Collinson in 1734. *R. calendulaceum* was not surely known in cultivation before 1806.

- Azalea, Indica (43) *Rhododendron indicum* Sweet
Known, but not cultivated in England in 1759; not surely introduced to cultivation in England until 1808. Probably introduced to Charleston, S.C., by André Michaux between 1787 and 1796.
- Azaleas, Swamp White. (43) *Rhododendron viscosum* (L.) Torrey
Native in eastern North America from Maine to Tennessee. Cultivated in England in 1734 by Peter Collinson.
- Beautyberry, American (43) *Callicarpa americana* L.
Native in North America from Maryland south to Florida and Texas. Sent by Mark Catesby from South Carolina to Phillip Miller in England in 1724.
- Beech, American (40, 43) *Fagus grandifolia* Ehrh.
Native in eastern North America from Prince Edward Island and Ontario to Florida and Texas. Introduced into cultivation in England in 1766 by the nursery firm of Kennedy and Lee.
- Beech, European. *Fagus sylvatica* L.
Native in Europe. Long used and cultivated for timber and food.
- Birch, Black (23, 24) *Betula lenta* L.
Native in eastern North America from Maine to Georgia. Cultivated in England by Phillip Miller in 1759.
- Birch, River (43) *Betula nigra* L.
Native in eastern North America from southern New England to Florida and Texas. Cultivated in England by Peter Collinson in 1736.
- Bittersweet, American (43) *Celastrus scandens* L.
Native in eastern North America from Quebec and Manitoba south to Georgia and Louisiana. Cultivated in England in 1736 by Peter Collinson.
- Black Gum, Tupelo, Black Tupelo, Sour Gum (10, 40, 43) *Nyssa sylvatica* Marshall
Native in eastern North America from Maine to Florida, Texas and Mexico. It was cultivated in Britain in 1750 by Archibald, Duke of Argyle.
- Broom, Scotch (40) *Cytisus scoparius* (L.) Wimmer
Native in Europe, long known and cultivated for a variety of purposes.
- Buckeye, Sweet (10) *Aesculus octandra* Marshall
Native in eastern North America, from Pennsylvania and Iowa south to Georgia. Cultivated in England in 1764 by Mr. John Greening.

- Burning Bush (10) *Euonymus atropurpureus*, Jacq.
Native in eastern North America from Ontario and Montana south to Alabama. Cultivated in England in 1756 by Messrs. Lee and Kennedy.
- Butchers Broom (43) *Ruscus aculeatus* L.
Native in southern Europe.
- Butternut (23, 43) *Juglans cinerea* L.
Native in eastern North America from New Brunswick to North Dakota and south to Georgia. Cultivated in England by John Tradescant, Junior, in 1656.
- Button Bush (43) *Cephalanthus occidentalis* L.
Native in eastern North America from Nova Scotia to Florida and Mexico. Cultivated in England in 1735 by Peter Collinson.
- Carolina Allspice, Sweetshrub (10, 40, 43) *Calycanthus floridus* L.
Native in eastern North America from Pennsylvania and Ohio to Florida and Mississippi. Introduced into cultivation in England by Mark Catesby in 1726.
- Cassine, Cassioberry, Yaupon (5, 10, 40, 43) *Ilex vomitoria* Aiton
Ilex cassine L.
Native of eastern North America, from southeastern Virginia south to Florida and Texas. Cultivated in England before 1700. Cassioberry is more properly a common name of *Ilex cassine* L. It is native on the coastal plains from North Carolina to Florida and Louisiana. Seed was sent to England in 1726 by Mark Catesby.
- Catalpa, Southern Catalpa (5, 10, 25, 40, 43) *Catalpa bignonioides* Walter
Native from Georgia and Florida to Mississippi. Sent to England by Mark Catesby in 1726.
- Cedar, Atlantic White (23, 24, 43) *Chamaecyparis thyoides* (L.) BSP.
Native in eastern North America from Maine to Florida and Mississippi. Cultivated in England by Peter Collinson about 1736.
- Chaste Tree (40) *Vitex agnus-castus* L.
Native in southern Europe and Western Asia. Cultivated in England in 1570 and recorded in Virginia by 1762.
- Cherry Laurel (40) *Prunus caroliniana* (Miller) Aiton
Native from South Carolina to Texas. Introduced into England about 1750 by Phillip Miller. Probably introduced to cultivation in Charleston by Mark Catesby about 1725.

1 *Pæoniamas.*
Male Peionie.



China-berry, Fruit of China, Bead Tree (10, 43)

Melia azedarach L.

Native in southern Asia. Cultivated in England in 1656. Said to have been introduced to Charleston, S.C., by André Michaux between 1787 and 1796.

Chinquapin (5)

Castanea pumila (L.) Miller

Native in eastern North America from Massachusetts to Florida and Texas. Cultivated in England in 1699 by the Duchess of Beaufort.

Chokeberry, Red (10, 40, 43)

Aronia arbutifolia (L.) Ell.

Native in eastern North America, from Nova Scotia to Texas. Mentioned by Josselyn in 1673 and cultivated in England by the Earl of Clarendon in 1700.

Clematis, Virgin's Bower (40, 43)

Clematis virginiana L.

Native from the Gaspé Peninsula to Manitoba and south to Georgia and Louisiana. Cultivated in England in 1767 by James Gordon.

Clethra, Sweet Pepper Bush (5, 25, 40, 43)

Clethra alnifolia L.

Native in eastern North America from Maine south to Florida and Texas. Introduced into cultivation in England about 1730.

Coffee-bean, Kentucky or Kentucky Coffee Tree (10, 43)

Gymnocladus dioica (L.)

K. Koch

Native in North America from central New York to South Dakota, south to Tennessee and Oklahoma. First cultivated in Europe at Paris, cultivated in England by Archibald, Duke of Argyle in 1748.

Coralberry (40)

Symphoricarpos orbiculatus

Moench.

Native in North America from Pennsylvania to Colorado, south to Florida and Texas. Cultivated in England in 1730.

Cornel, White (10)

Cornus alba L.

Native in northeastern Asia. Cultivated in England by Phillip Miller in 1759.

Cowberry or Lingon (23, 24)

Vaccinium vitis-idaea L.

This is the common name of the plant which has probably never been cultivated in this country.

—Cranberry (23)

Vaccinium oxycoccus L.

This fruit was much esteemed in the Philadelphia market at the time of Kalm's visit. Not cultivated, however, until about 1802.

Crabapple, Wild Sweet Crabapple, Anchor Tree (10, 43)

Malus coronaria (L.) Miller

Native in North America from New York to Wisconsin and south to Tennessee. Cultivated in England in 1724.

Crape-myrtle, Common (10, 43, 45) *Lagerstroemia indica* L.

Native in China. First introduced into Europe in 1747. Cultivated in England in 1759 by Hugh, Duke of Northumberland. Introduced to Charleston by André Michaux between 1787 and 1796.

Cross-vine (40, 43) *Bignonia capreolata* L.

Native in eastern north America from Maryland to Illinois south to Florida and Louisiana. Cultivated in England in 1730.

Cypress, Bald or Deciduous (10) *Taxodium distichum* (L.)

Richard

Native in North America from New Jersey to Illinois, south to Florida and Texas. Cultivated in England in 1640 by John Tradescant, Senior.

Cyrilla, Swamp (43) *Cyrilla racemiflora* L.

Native in eastern North America from Virginia to Florida and Texas. Cultivated in England in 1765 by John Cree.

Elder, American (5, 23, 43) *Sambucus canadensis* L.

Native in eastern North America from Cape Breton Island and Manitoba to Georgia and Louisiana. Cultivated in England in 1768.

Elder, Box (43) *Acer negundo* L.

Native in North America from western New England and Minnesota south to Florida and Texas. Cultivated in England by Bishop Compton in 1688.

Elm, American (23, 25, 43) *Ulmus americana* L.

Native in North America from the Gaspé to Saskatchewan, south to Florida and Texas. Introduced into cultivation in England in 1752.

—Elm, Winged (43) *Ulmus alata* Michx.

Native in North America from Virginia west to Illinois, southward to Florida and Texas. Possibly cultivated here, but not introduced to England until 1820.

Emerus (5) *Coronilla emerus* L.

Native. Cultivated in England in the time of Gerard 1596.

Fringe Tree (10, 40, 43) *Chionanthus virginica* L.

Native in North America from New Jersey and Ohio south to Florida and Texas. Cultivated in England in 1736 by Peter Collinson.

Fern, Sweet (43)

Comptonia peregrina (L.)

Coulter

Native in North America from Cape Breton Island to Manitoba, south to Georgia and Tennessee. Cultivated in England in 1714 by the Duchess of Beaufort.

Flowering Almond, Dwarf (25) *Prunus glandulosa* Thunberg.
var. *sinensis* (Persoon)

Koehne fil.

Native in east Asia. Introduced into cultivation in England in 1687 according to Rehder.

Fothergilla, Dwarf (43) *Fothergilla gardenii* Murr.

Native from North Carolina to Florida and Alabama. Cultivated in England in 1765.

Franklinia (10, 25, 43) *Franklinia alatamaha* Marshall

Discovered in Georgia in 1765. It was grown by John Bartram in his botanical garden, but not used extensively in garden plantings at this period.

Golden Rain Tree (43) *Koelreuteria paniculata*, Laxmann

Native in China, Korea, and Japan. Cultivated in England in 1763.

Grape, Muscadine, Scuppernong (43) *Vitis rotundifolia* Michx.

Not surely cultivated before 1850 but the fruit likely collected from the wild throughout the period.

Groundsel Tree (40) *Baccharus halimifolia* L.

Native in North America from Massachusetts south to Florida, Texas, and Mexico. Cultivated in England in 1688 by Bishop Compton.

Haw, Black, or Blackhaw Viburnum (5, 10, 43)

Viburnum prunifolium L.

Native in North America from Connecticut and Kansas, south to Florida and Texas. Cultivated in England in 1731.

Hawthorn, Cock-spur or Haw (5, 23) *Crataegus crus-galli* L.

Native in North America from southeastern Canada west to Minnesota, south to South Carolina and Texas. Cultivated in England in 1691 by the Honorable Charles Howard.

—Hawthorn, or May (10) *Crataegus oxycantha* L.

Native in Europe and North Africa. Long cultivated.

—Hawthorn, Washington Thorn (10, 40, 43)

Crataegus phaenopyrum (L.f.)

Medic.

Native in North America from Pennsylvania and Missouri to Florida. Cultivated in England in 1738.

Hickory, Scaly-bark *Carya ovata* (Miller) K. Koch
Native in North America from Maine to Nebraska south to Florida and Texas. Cultivated in 1629.

—Hickory, Shellbark (10) *Carya laciniosa* Loud.
Native from New York to Nebraska, south to Alabama and Louisiana. Not surely cultivated before 1804.

Holly, Evergreen *Ilex aquifolium* L.
Ilex opaca Aiton
The European Holly was repeatedly imported to America but with little success. American Holly was cultivated in England by 1744.

—Holly, Swamp or Possum haw (40, 43) *Ilex decidua*
Walter
Native in North America from Maryland and Kansas south to Florida and Texas. Cultivated in Britain in 1760 by Archibald, Duke of Argyle.

Honey Locust (10, 23, 40, 43) *Gleditsia triacanthos* L.
Native in North America from New York and South Dakota to Florida and Texas. Cultivated in England in 1700 by Bishop Compton.

Honeysuckle, Tartarian (43) *Lonicera tartarica* L.
Native in Southern Russia. Cultivated in England in 1752.

—Honeysuckle, Wild or Pinxterbloom azalea — See Azalea, Flame.

Hornbeam, American (43) *Carpinus caroliniana* Walter
Native from Nova Scotia to Minnesota south to Florida and Texas. Not introduced into England until 1812.

Horse Chestnut (32, 35) *Aesculus hippocastanum* L.
“ . . . The Horse-chestnut was brought from the northern part of Asia into Europe about the year 1550, and was sent to Vienna about the year 1558. [From Vienna it migrated into Italy and France: but it came to us from the Levant immediately. Gerard, in his herbal, speaks of it only as a foreign tree. In Johnson’s edition of the same work, it is said, ‘Horse-chestnut groweth in Italy, and in sundry dry places of the East Countries; it is now growing with Mr. Tradescant at South-Lambeth.’ Parkinson says ‘our Christian world had first the knowledge of it from Constantinople.’” (31). Introduced to Philadelphia by John Bartram in 1746.

—Horse Chestnut, Dwarf; Red Buckeye (10, 40, 43) *Aesculus pavia* L.
Native in North America from Virginia south to Florida and Louisiana. Cultivated in England in 1712.

- Hydrangea, Smooth (10, 43) *Hydrangea arborescens* L.
 Native in eastern North America from southwestern New York to Missouri, southward to Florida and Louisiana. Cultivated in England in 1736 by Peter Collinson.
- Inkberry (43) *Ilex glabra* (L.) Gray
 Native in eastern North America from Nova Scotia to Florida. Cultivated in England in 1759.
- Ironwood or Hop Tree (10) *Ostrya virginiana* (Miller) K. Koch
 Native from Nova Scotia to Manitoba, south to Georgia and Oklahoma. Cultivated in England in 1692.
- Ivy, English (23, 25, 40, 43) *Hedera helix* L.
 Native in Europe. Cultivated from ancient times. Reported in cultivation in North America by Kalm in 1750.
- Juniper (24) *Juniperus communis* L.
 Native in Eurasia and North America. Cultivated in England in 1560.
- Juniper, Chinese (45) *Juniperus chinensis* L.
 Native in China, Mongolia, and Japan. Cultivated in England by 1767.
- Laurel, or Ivy, or Mountain Laurel *Kalmia latifolia* L.
 (5, 10, 23, 43)
 Native from New Brunswick to Ohio, south to Florida and Louisiana. Introduced to England by Peter Collinson in 1734.
- *Rhododendron maximum* L.
 Native from Nova Scotia to Ohio, south to Georgia and Alabama. Introduced to England in 1736 by Peter Collinson. It did not flower there until 1756.
- Leatherwood (23, 24) *Dirca palustris* L.
 Native from New Brunswick to Minnesota, south to France and Louisiana. Introduced in Britain by Archibald, Duke of Argyle, in 1750.
- Leucothoe (10) *Leucothoe axillaris* (Lam.) D. Don
 Native in eastern North America from Virginia to Florida and Mississippi. Cultivated in England in 1765 by John Cree.
- Linden, American (23, 24, 40, 43) *Tilia americana* L.
 Native from New Brunswick to Manitoba south to Alabama and Texas. Cultivated in England in 1752.
- Loblolly Pine (40, 43) *Pinus taeda* L.
 Native in eastern North America from New Jersey to Texas. Cultivated in England in 1736.

Locust, Pink or Rose Acacia Locust (40, 43) *Robinia hispida* L.
Native from Virginia and Tennessee southward. Cultivated in England in 1758.

Magnolia, Southern or Carolina Laurel *Magnolia grandiflora* L.
(5, 10, 40, 43)

Native in eastern North America from North Carolina to Texas. Sent to England before 1737 by Mark Catesby.

Maple, Norway (43, 45) *Acer platanoides* L.

Native in Europe. Not cultivated in England until 1724. Introduced by William Hamilton of Philadelphia after the Revolutionary War.

——Maple, Silver (10, 43) *Acer saccharinum* L.

Native in North America from New Brunswick to Minnesota southward. At this period much confused with Sugar Maple. Said to have been introduced in England in 1725.

Maple, Sugar (10, 43) *Acer saccharum* Marshall

Native in North America from the Gaspé to Manitoba, south to Georgia and Texas. Silver and Sugar Maple were distinguished by Humphrey Marshall in 1785. Said to have been cultivated in England in 1735.

Mespilus, Snowy (10) *Amelanchier stolonifera*

Weigand

Native in eastern North America from Newfoundland to Ontario south to Virginia. Based on the description of cultivated plants this probably was the species cultivated in England as early as 1746.

Mimosa (40) *Albizia julibrissin* Dur.

Native from Persia to China. Cultivated in England in 1745.

Nannyberry or Sheepberry (10, 43) *Viburnum lentago* L.

Native in North America from Quebec to Colorado south to Georgia. Cultivated in England in 1761.

Moosewood (10) *Acer pensylvanicum* L.

Native from Quebec to Manitoba south to Georgia and Tennessee. Cultivated in England in 1755.

New Jersey Tea (5) *Ceanothus americanus* L.

Native in eastern North America from Quebec and Manitoba south to Florida and Alabama. Cultivated in England before 1713 by Bishop Compton.

Oak, Black (10, 43) *Quercus velutina* Lam.

Native from Maine to Nebraska, south to Florida and Texas.

——Oak, Blackjack (10, 43) *Quercus marilandica* Muench.

Native from Pennsylvania to Nebraska, south to Florida and Texas.

- Oak, Chestnut (10) *Quercus prinus* L.
Native from Maine to Indiana, south to Georgia and Mississippi. Cultivated in England in 1730.
- Oak, Live (10, 40, 43) *Quercus virginiana* Miller
Native from Virginia to Texas and Oklahoma. Cultivated in England in 1739.
- Oak, Southern Red (43) *Quercus falcata*, Michx.
Native from New Jersey to Illinois, south to Florida and Texas. Cultivated in England in 1763.
- Oak, Water (10, 43) *Quercus nigra* L.
Native from Delaware to Kentucky south to Florida and Texas. Cultivated in England in 1739.
- Oak, Willow (40, 43) *Quercus phellos* L.
Native from Long Island to Missouri, south to Florida and Texas. Confused at this time with Live Oak.
- Olive, Russian, or Oleaster (43, 47) *Elaeagnus angustifolia* L.
Native from Southern Europe to central Asia. Cultivated in England in 1633.
- Pagoda tree, Japanese (43) *Sophora japonica* L.
Native in China and Korea. Cultivated in England in 1753.
- Paper Mulberry, Common (43) *Broussonetia papyrifera* (L.)
Vent.
Native in China and Japan. Cultivated in England in 1759, by Hugh, Duke of Northumberland. Female trees reported to be cultivated by 1768. Male trees said to have been introduced to New York by Andre Parmentier between 1824 and 1830.
- Pawpaw (10, 43) *Asimina triloba* (L.) Dunal
Native from New Jersey to Nebraska, south to Florida and Texas. Cultivated in England by Peter Collinson in 1736.
- Pea-shrub, Siberian (43) *Caragana arborescens* Lam.
Native in Siberia and Manchuria. Cultivated in England in 1756.
- Pecan, Mississippi Nut (10) *Carya illinoensis* K. Koch
Native from Indiana to Iowa, south to Alabama, Texas and Mexico. Introduced into England about 1766. Cultivated by William Prince of New York in 1772.
- Persimmon (23, 40) *Diospyros virginiana* L.
Native from New England to Kansas, south to Florida and Texas. Cultivated in England in the time of Parkinson (1633).
- Pine, Virginia Scrub (10, 40, 43) *Pinus virginiana* Miller
Native from New Jersey and Ohio south to Georgia and Arkansas. Introduced into England before 1739.

—Pine, White, or Weymouth Pine (10, 40) *Pinus strobus* L.
Native from Newfoundland to Manitoba, south to Georgia
and Tennessee. Cultivated in England by the Duchess of
Beaufort in 1705.

Plum, Cherry, or Myrobalan Plum (10, 43) *Prunus cerasifera*
Ehrh.
Native in western Asia. Cultivated in England by 1600.

—Plum, Damson (10) *Prunus insititia* L.
Native in western Asia and Europe. Cultivated since pre-
historic times.

Poison Oak (5) *Rhus toxicodendron* L. or
Rhus radicans L.
Native over most of eastern North America. Cultivated in
England in 1640.

Poplar, Eastern Cottonwood (43) *Populus deltoides* Marshall
Native from Quebec to Manitoba, south to Florida and Texas.
Cultivated in England before 1750.

—Poplar, Lombardy (43) *Populus nigra* L. var.
italica, Moench.
Native in Europe. Cultivated in France in 1749 and in
England in 1758. Introduced by William Hamilton of Phila-
delphia in 1784.

Potentilla (23) *Potentilla fruticosa* L.
Native throughout the northern hemisphere. Cultivated in
England in 1700.

Red Bay (40, 43) *Persea borbonia* (L.)
Sprengel
Native from Delaware south to Florida and Texas. Culti-
vated in England in 1739.

Rose, Cherokee (40) *Rosa laevigata* Michx.
Native in China. Introduced to the United States before
1780.

—Rose, Scotch (40) *Rosa spinosissima* L.
Native in Europe and western Asia. Cultivated before 1600.

—Rose, Wild, or Swamp Rose (10, 43) *Rosa palustris*
Marshall
Native from Nova Scotia to Minnesota, south to Florida and
Arkansas. Cultivated in England in 1726.

Shadblow, Service or Shad-bush (10, 40) *Amelanchier canadensis* (L.) Medic.
Native in North America from Maine to New York, south to
Georgia. Quite possibly cultivated, but the plant carrying this

name in cultivation in Europe was probably *A. stolonifera* (see *Mespilus*, Snowy).

Silver bell, Carolina or Snowdrop Tree (10, 25, 40, 43)

Halesia carolina L.

Native from Virginia to Missouri, south to Florida and Texas. Cultivated in England by John Ellis in 1756 from seeds sent by Dr. Alexander Garden.

Sourwood (40)

Oxydendron arboreum (L.) DC.

Native from Pennsylvania to Indiana south to Florida and Louisiana. Cultivated in England in 1752.

Spiraea, Hardhack (43)

Spiraea tomentosa L.

Native from Prince Edward Island to Ontario, south to North Carolina. Cultivated in England in 1736 by Peter Collinson.

Stewartia (40, 43)

Stewartia malachodendron L.

Native from Virginia to Arkansas, south to Florida and Louisiana. Cultivated in England in 1743.

——Stewartia, Mountain (43)

Stewartia ovata (Cav.)

Weatherby

Native from Virginia and Kentucky, south to Georgia and Alabama. Cultivated in England in 1785.

Sumac, Fragrant, or Pole-cat Bush (40, 43)

Rhus aromatica

Aiton

Native from Quebec to Kansas, south to Florida and Texas. Cultivated in England in 1772.

Sweet Gale (10, 23, 24)

Myrica gale L.

Native to Eurasia and North America. It has many folk uses in Europe.

Thorn, Great-fruited or Large-berried (10)

Crataegus punctatus Jacq.

Native from eastern Canada to Iowa, south to Kentucky. Cultivated in Britain in 1746 by Archibald, Duke of Argyle.

Trefoil, or Hop-tree (10)

Ptelea trifoliata L.

Native from Virginia south to Florida and Texas. Sent to England from Virginia by Rev. Banister in 1704.

Umbrella Magnolia (5, 25)

Magnolia tripetala L.

Native from Pennsylvania to Missouri, south to Georgia and Arkansas. Cultivated in England in 1752.

Viburnum, Maple Leaf

Viburnum acerifolium L.

Native from Quebec to Minnesota, south to Georgia and Tennessee. Cultivated in England in 1736 by Peter Collinson.

Willow, Virginia, or Sweet Spire (10, 43)

Itea virginica L.

Native from Pennsylvania to Missouri, south to Florida and

Texas. Cultivated in Britain in 1744 by Archibald, Duke of Argyle.

Willow, Weeping (10, 40, 43) *Salix babylonica* L.

Native in China. Alleged to have been introduced to England by Alexander Pope about 1730.

—Willow, Yellow (10) *Salix alba* L. var. *vitellina* (L.) Stokes

Native in Europe. Long cultivated for basket-making.

Winterberry or Swamp Red-berry Bush *Ilex verticillata* (L.) Gray
(10, 40, 43)

Native from Newfoundland to Minnesota, south to Georgia and Tennessee. Cultivated in England in 1736 by Peter Collinson.

Wintersweet (43) *Chimonanthus praecox* (L.) Link.

Native of China. Introduced into England by Benjamin Torin in 1771, or perhaps a little earlier.

Wisteria, American (40, 43) *Wisteria frutescens* (L.) Poiret

Native from Virginia, south to Florida and Alabama. Introduced in England in 1724 by Mark Catesby.

Witherod (43) *Viburnum cassinoides* L.

Native from Newfoundland to Ontario, south to Alabama and Tennessee. Cultivated in England in 1761 by Mr. James Gordon.

Yew, English Yew (5, 10, 43) Probably *Taxus baccata* L.

Native in Europe and Western Asia. Cultivated since ancient times.



Gentlewomen if the ground be not too wet may doe themselves much good by kneeling upon a cushion and weeding. *The Art of Simpling*, by William Coles, London, 1656.

IX Fruits and Nuts, 1700 to 1776

- Blackberry (23, 38) *Rubus* sp.
Fruits of various species of *Rubus* were collected from plants growing spontaneously in hedge-rows. Blackberries were not cultivated until 1832.
- Chestnut (5) *Castanea dentata* (Marshall) Borkh.
Native from Maine to Minnesota, south to Florida and Mississippi.
- Chestnut, French (5) *Castanea sativa* Miller
Native in southern Europe, western Asia and North Africa. Cultivated by Thomas Jefferson in 1773.
- Crab Apple *Malus angustifolia* (Aiton) Michx.
Native from Virginia to Florida and Mississippi. Introduced into cultivation in Britain in 1725.
- Cranberry (23) *Vaccinium macrocarpon* Aiton
Newfoundland to Minnesota, south to North Carolina and Arkansas. Fruit collected in the wild from early colonial times, but not cultivated until about 1820.
- Currant, European Black (24) *Ribes nigrum* L.
Native in Europe and northern and central Asia. Long cultivated.
- Mulberry, White (5, 41, 43) *Morus alba* L.
Native of China and Japan. Cultivated in America about 1660.
- Mulberry, Red *Morus rubra* L.
Native from Vermont to South Dakota, south to Florida and Texas. Cultivated in Britain in 1629.
- Olive (5) *Olea europaea* L.
Native in the Mediterranean region. Cultivated in South Carolina in 1775.

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Some Additional Sources of Information Chronologically Arranged

The great value of a library is that it preserves the records of the work of one generation so that subsequent generations may benefit from them. Interest in the cultivated plants of the American colonies is not new. Records of the plants cultivated by the Indians were made by the first explorers of our continent. Travellers and residents throughout the colonial period recorded information on the plants that were under cultivation. The newspapers in the colonies carried advertisements of plants and seeds offered for sale. In recent years biographies of early horticulturists and botanists have added much to our knowledge.

The following list of book titles does not pretend to be complete. Indeed, many important titles, published in the nineteenth and early twentieth centuries have been omitted. However, in conjunction with the lists of titles given in the preceding articles, the inquiring reader can make a beginning on the study of the cultivated plants of the colonial period.

- 1588 Harriot, Thomas. *A Briefe and True Report of the New Found Land of Virginia* . . .
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- 1608 Smith, John. *A True Relation of such Occurance and Accidents of Noate as hath hapned in Virginia* . . .
London: J. Tappe
- 1611 Lascarbot, Marc. *Histoire de la Nouvelle-France* . . . (ed. 2)
Paris.
- 1612 Smith, John. *A Map of Virginia, with a Description* . . .
Oxford: J. Barnes.
- 1614 Smith, John. *A Description of New England* . . .
London: H. Lownes.
- 1624 Smith, John. *General Historie of Virginia, New England, and the Summer Isles*
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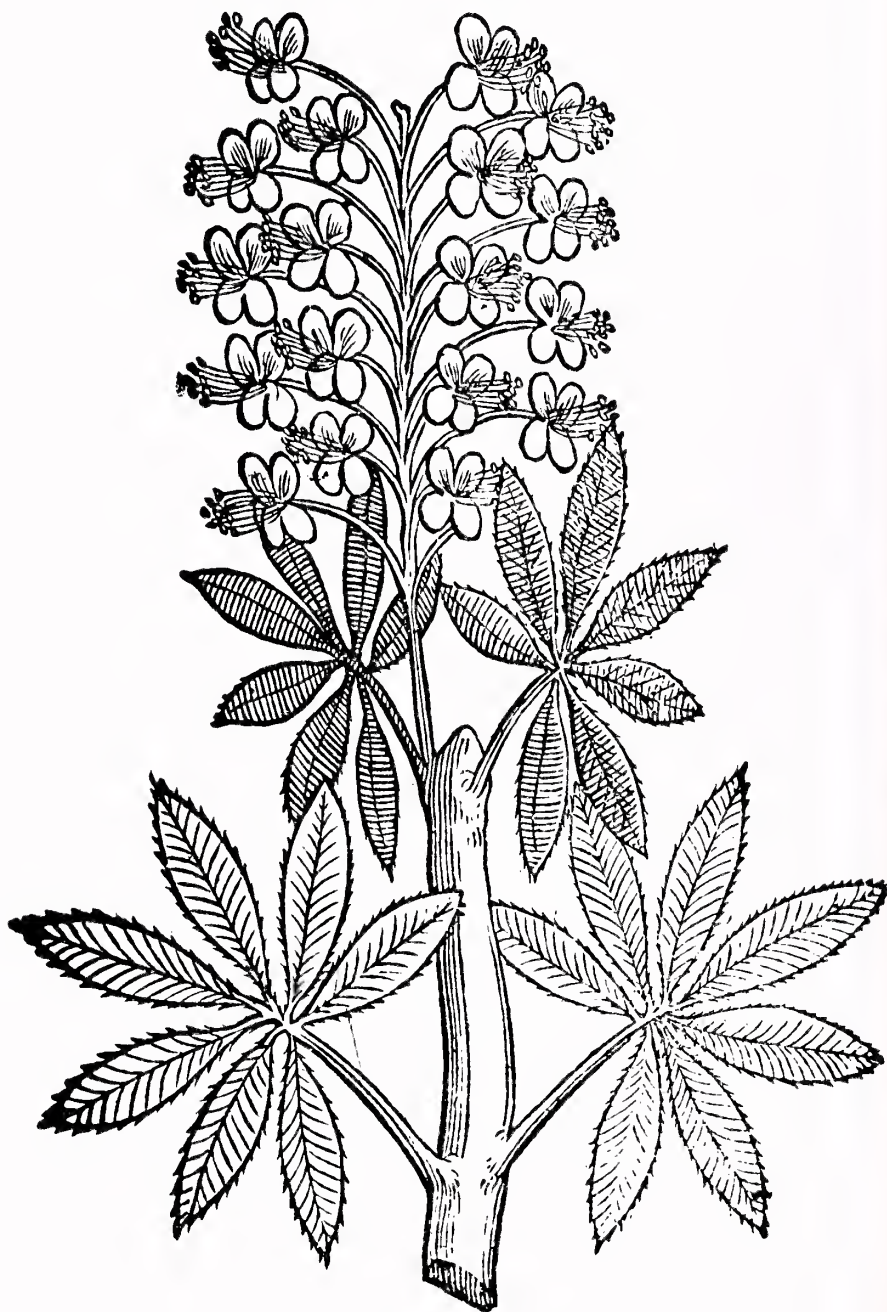
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GORDON P. DEWOLF, JR.

2. *Castanea Equina cum flore.*
Horse Chestnut tree in floure.



‡ 3 *Syringa Arabica.*
Arabian Pipe.



Notes from the Arnold Arboretum

Propagation of Fothergilla

By Seed

There is little latitude in collection time of *Fothergilla* seeds. In the Boston area the fruits ripen about mid-September. They consist of capsules which shrink as they dry and bring pressure to bear on the seeds within. Finally, with a sharp snapping sound, the smooth, shiny seeds are ejected. By this dispersal adaptation the seeds are propelled away and will not be in competition with the parent plant. Scattering commences about mid-September and in a few days all are dispersed. To harvest the seeds one must watch the fruits carefully, and when they have turned from green to gray-brown, gather them just before they pop. After collection the capsules are placed in a warm, dry location in a container such as a paper bag fastened at the opening with a paper clip. If not confined, the seeds will be strewn all over the area as they are dispelled. In a few days the seeds will have popped and can be separated from the capsules by screening.

Seeds of *Fothergilla major* and *F. gardenii* have proved to be doubly dormant (two year seeds) and pretreatment must be done in two stages. To be prepared for germination they require warm fluctuating temperatures followed by a period of cold. Pretreatment may be done in polyethylene plastic bags which have the property of being air-permeable yet vapor-proof, making them ideal for seed stratification.

The stratification medium can be composed of one-half sand and one-half peat moss mixed together and dampened. Emphasis is placed on the word "dampened" for a wet soggy medium could exclude sufficient oxygen. In proportion the medium should be two or three times the volume of the seeds. The seeds are combined with the medium and the mixture is placed

in the polyethylene bag which is bound with a rubber band making it vapor proof.

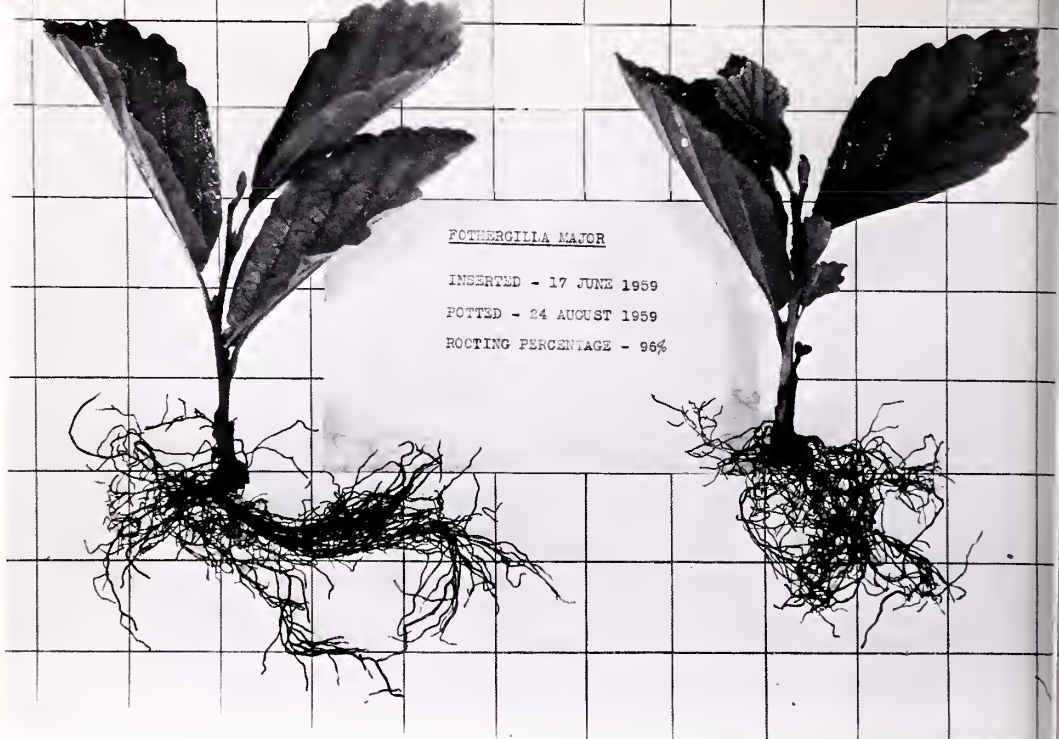
For the warm period of stratification the unit is placed in a location such as a greenhouse bench, window sill or similar site where the day and night temperature will fluctuate. However, direct sun should be avoided for it could lead to a detrimental build-up of heat. *Fothergilla major* seeds have required exceptionally long periods of warm stratification with 12 months being optimum. After warm treatment they are transferred to a 40° refrigerator for 3 months. This satisfies the cold requirement and the seeds are ready to be sown. A high percentage of germination can be expected in about 2 weeks. *Fothergilla gardenii* has germinated well after 6 months of warm pretreatment followed by 3 months at 40°. An alternative procedure to prepare *Fothergilla* seeds would be to sow them out-of-doors. In this case seeds sown in autumn of 1971 would be expected to germinate in spring of 1973.

Layering

Layering provides a simple and reliable method which enables an amateur to produce plants of *Fothergilla*. Any branch pliable enough to be bent to the ground is suitable for layering. Fairly large sized branches can be used and they will lead to faster production of flowering specimens. A favorable time to layer is early spring before the plant comes into leaf. A narrow trench 3 or 4 inches deep and a foot or so long is excavated where the branch arches down to the soil. Place the branch in the trench in such a manner that the last foot or so can be bent to a vertical position. In the area of the bend, remove a 4- or 5-inch slice from the lower part of the branch. Next peg the branch down firmly in the area of the cut with a large wire staple made from a coat hanger or other wire and refill the trench. Filling the trench and placing a stone on the surface of the soil is satisfactory. The branch tip is next brought to a vertical position and staked so it will remain that way. After two growing seasons the layer will have sufficient roots to be severed from the parent plant.

Division

Fothergilla plants can be increased by division. To do this, select a portion of the plant with stems that seem separable. With a spade or mattock, cut it away making certain to retain as many roots as possible.



Fothergilla seedlings two months old. These seedlings did not survive the first winter. Photo: Alfred Fordham.

Grafting

Fothergilla species can be propagated by grafting in winter using established understocks of *Hamamelis virginiana*. This practice is unjustified, however, for *Fothergilla* roots well from cuttings. Shoots arising from the understocks of grafted plants can create a nuisance which is averted when propagants are on their own roots.

Cuttings

Both species of *Fothergilla* root well from softwood cuttings. In the Boston area a favorable time to take cuttings has been in the past about the third week in June. Cuttings can be treated with any of several available root-inducing substances containing IBA at the rate of 8 m. to a gram of talc.

Although *Fothergilla* cuttings form roots readily the resulting plants may have trouble surviving the first winter. When transplanted after rooting they go into a dormancy from which they never recover. Such loss can be avoided if the cuttings are not disturbed after they have rooted. At the Arnold Arboretum we accomplish this by filling plastic flats with a medium consisting of one half sand and one half horticultural grade Perlite. The cuttings are inserted and the units are placed either under mist or in polyethylene chambers. Either has been satisfactory for propagating *Fothergilla*. When rooted, the cuttings are left in the flats and hardened off. In the autumn the flats of dormant cuttings are transferred to our cold storage unit which is maintained at about 34°. In February or March, depending on convenience to the work schedule, the flats are returned to a warm greenhouse. When new growth appears the cuttings are moved to peat pots if they are to be planted out in spring or to two-quart containers in which they can be grown for the first year.

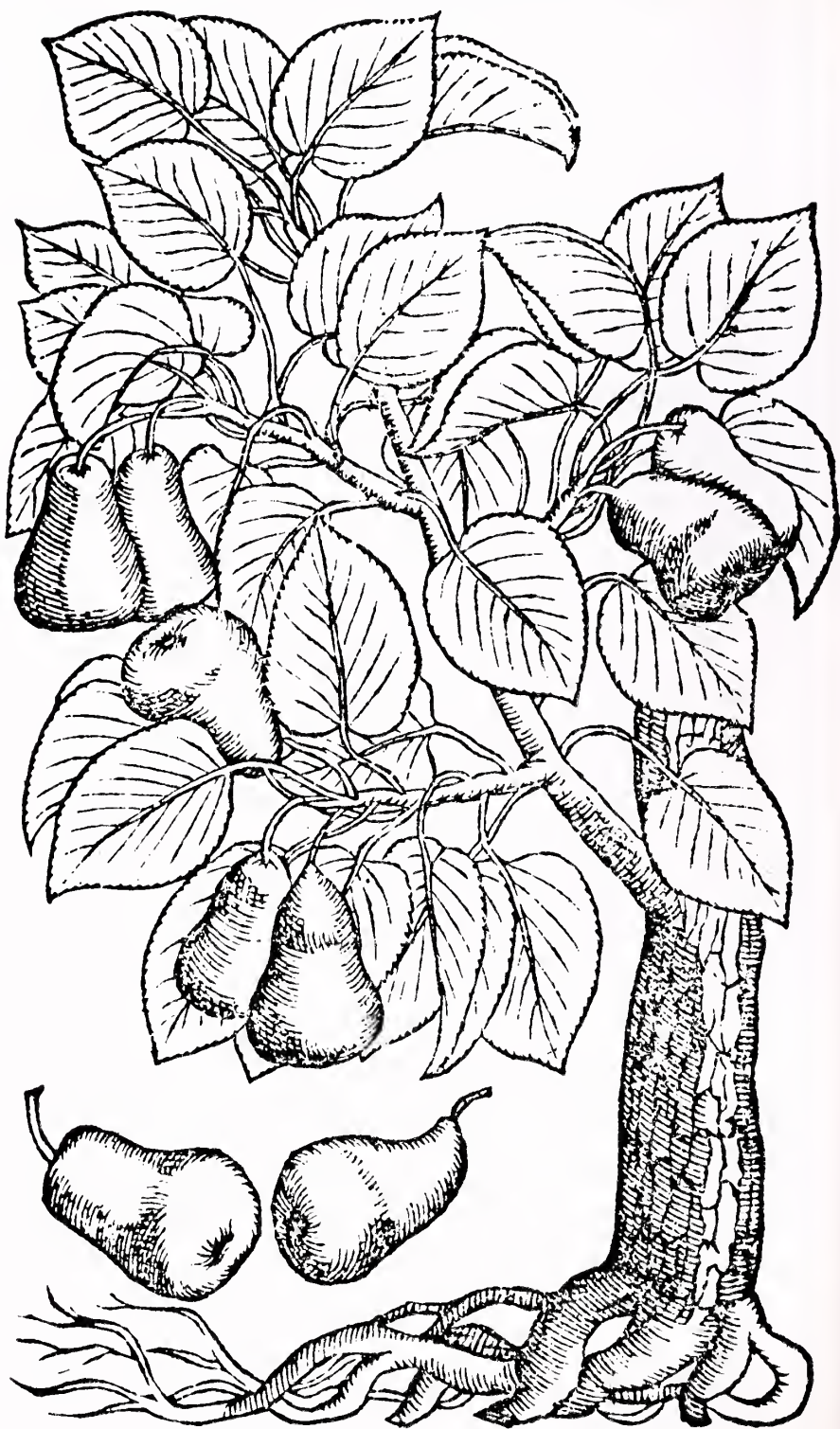
ALFRED J. FORDHAM



Correction

Through error the Table of Contents for the January issue of *Arnoldia* lists the author of the article "Robert Fortune and the Cultivation of Tea in the United States" as Robert Gardener. The correct name of the author is William Gardener.

Pirus. The Pearce tree.





*Detail from New England Dooryard
(see front cover).*

ARNOLDIA *is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Massachusetts, U.S.A.*

ARNOLDIA

The Arnold Arboretum

Vol. 31, No. 5

Sept. 1971



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NEW YORK
BOTANICAL GARDEN

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ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Mass. 02130

*Published six times a year: on the 15th of January,
March, May, July, September, and November*
Subscriptions: \$3.50 per year. Single copies, 60 cents
Second-Class Postage Paid at Boston, Mass.

*Cover: Sandstone islets with Pinus thunbergii. In foreground is Pinus
densiflora. Photo: E. H. Wilson, Japan, 1914.*

An Informal History of Bonsai

One of the few positive aspects of human warfare is the inevitable blending of cultures which takes place immediately upon the cessation of hostile activities. For a short but crucial period the victor is exposed to the best and worst of the former enemy, and vice-versa. In the wake of World War II American society has responded with élan to this exposure and to the widest possible variety of things Japanese. Typical of this has been the popularity of the *shibui* object, understated elegance in home design, house furnishings, and gardens, and a renewed interest in oriental arts and crafts.

Immediately after the close of hostilities in 1945 a flood of occupation forces, and, a bit later, trade representatives, began short tours of duty in Japan. In the ten years between 1945 and 1955, hundreds of thousands of Americans spent time in Japan. Persons from every walk of American society enjoyed this cross-cultural experience, one which formerly had been confined to diplomats, businessmen and the affluent. (In fact even through the war years Japan and the Japanese remained a sort of abstraction to the bulk of the American population.) Among those multitudinous aspects of Japanese culture which remained in mind was the feeling conveyed to the westerners by those small, carefully trained but artless and natural appearing trees contained by glazed or unglazed pottery containers — the bonsai.

Americans, who will celebrate the 200th anniversary of their country's founding in 1976, were faced with the living cultural artifacts of a nation which, although like the Americans in having been the result of wave after wave of migrations, had nearly 2,000 years of *in situ* cultural history. Indeed some of the bonsai were twice as old as the American nation! Little wonder that popular authors referred to the "mysterious" culture techniques, since bonsai were another facet of the "inscrutable"

orient! In addition to age which never fails to intrigue Americans, the living trees, many of which only simulate age, also convey other admirable qualities which would entrance *les nouveaux venus* of every age — endurance, natural beauty and understated strength.

Although many treasures were destroyed during the war, and many living gardens and bonsai were lost for lack of care and watering, one can only wonder at the large number of very old trees which survived. And, unlike other works of art, living treasures required great care after substantial initial investment. Since the importation of living plants involves permit procedures of some complexity very few bonsai came to the United States in the postwar years. However, the small trees are such an ubiquitous part of Japanese life that it is safe to say that tens of thousands say, enjoyed, and cherished the idea of bonsai.

There were several day-to-day indications that bonsai had captured the American imagination. Christmas cards printed in Japan for Americans featured a dwarf tree motif. In the mid-1950's American florist and gift shops blossomed with non-living dwarf trees concocted from driftwood or weathered branches topped with a flattened gray lichen to simulate foliage. A species of *Filago*, a flat perennial herb of the Composite family, was imported from India at this time for similar use. These "ming" trees were American equivalents of similarly artificial trees popular among the Chinese for household decor often fashioned from carved semi-precious stones. One of the earliest popular articles entitled "How to Make a Tree" [living] appeared in the March 1950 issue of American Homes Magazine. A flood of publications to follow in the 1960's would demythologize the art for the American public. The strong economic bonds between the United States and Japan has allowed the initial cultural flow to continue through the 1970's. As more Americans were able to visit Japan and bonsai materials began to be exported local groups were formed particularly in California where many Americans of Japanese ancestry were leaders in the foundation of the California Bonsai Society in 1950. Later a national organization, the American Bonsai Society, with numerous affiliates, was organized in 1967.

Before we look at the early movement of bonsai in the West or at the earliest examples from China perhaps we should consider the development of the art in Japan, the country with the earliest leading exponents in modern times, the coiners of the term itself (derived from the Chinese word *p'en tsai*), and the

"Stories of Ladies" by Chin Ying (Ming Period 1368–1644) Top: Terrace scene with screen, lacquer table, small potted tree. Bottom: Garden with potted plants and small trees. An aptly named era (Ming means bright), it was an era of native rule first in Nanking then in Peking. Fogg Art Museum, Oriental Dept., Harvard University.

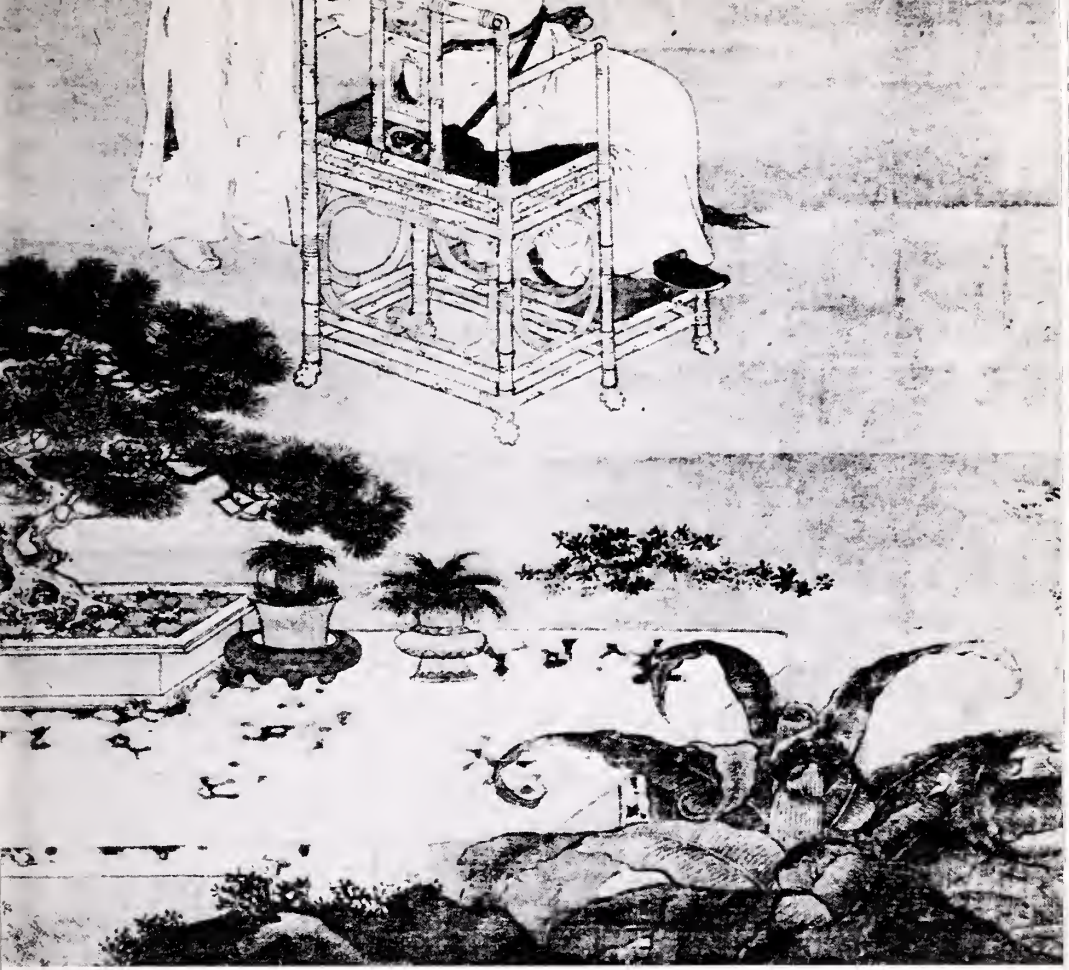


country which has the largest current number of practitioners. (An early use of the word *bonsai* appears in the *Seiwanmyoen-Zushi* published in Osaka in 1875.) For, as we shall see, while many styles of training trees and schools of culture have developed into cults in Japan, and while the culturing of the trees there is centuries old, there is evidence that the art was flourishing in China before the Sung Period (960–1279).

The introduction of Buddhism to Japan about 550 is very important in considering the history of bonsai for it was in the centuries immediately after that the cultural flowering of China during the T'ang period (618–906) flowed to Japan. Zen Buddhism was to become a popular religion and forever after to touch the weft of Japanese life. With Zen comes the perfection of the miniature and the associated ideals of self discipline and the emulation of Nature. Potted trees kept small could serve as objects of contemplation as well as decoration. Within the temples small landscapes and gardens were used symbolically to represent Horai-san, the sacred Taoist mountain of eternal youth. Trees and shrubs in the ground were pruned for natural effects so that via miniaturization a natural contemplative scene could be achieved. P'en tsai may have originated from transferring small trees from small landscape dramas and/or by artful pruning of larger potted trees used as relief against the traditional oval, rectangular and square motifs of courts, furniture and most man-made construction. Strong cultural exchanges between Japan and China began early — during the Fujiwara Era (794–1192). Earlier the Japanese had been awed by the wealth and sophistication of the Chinese Court. The customs and religion of China were adopted in part by the ruling classes of Japan.

Among early Japanese art works still extant which show dwarf trees is the scroll *Tsurezure Gusa* by Kenko Yoshida (1283–1351) and the fifth part of the twenty-scroll *Kasuga Gongen Kenki* by Takakone Takashima executed in 1309. Much later, in 1890, Tomioka Tessai (1837–1924) painting in a style reminiscent of earlier Chinese artists of the T'ang Period (618–906) produced a scroll depicting two trees in the natural style.

In the Japanese literary realm the earliest reference to bonsai occurs in a document dating to 1095 in which the cultivation of bonsai is related as an elegant activity for the samurai. Thus, only four hundred years after Buddhism was made a part of the state religion (in 685), the technique of bonsai cultivation received official approbation for the ruling class. In his collection of essays entitled *Tsurezure Gusa*, Kenko Yoshida criticized



Unsigned work from the Sung Period (960–1279). Pinus sp., p'en tsai on garden table. The Sung was a time characterized by a rise in commercialism and education. The Sung artists depicted the nouveau riche of their time. From The Pageant of Chinese Painting. Otsuke Kogeisha, Tokyo, 1936.

the bad taste of enjoying deformed trees and disproves that this form was preferred by those of his time. In the *Noh* drama *Hachi-no-ki* of the Muromachi Period (1334–1573) the author Zeami (1363–1443) develops a story about the fifth ruler of the Kamakura government who, wandering as a monk, is welcomed to the humble house of a discredited samurai. The latter is willing to sacrifice a cherished bonsai to warm the visitor. As a consequence the official is restored, and three flowering trees,

the apricot, cherry and pine, are established as bonsai favorites — as these were made as gifts from the ruler to the filial servant. There is also the legend of Hikozaemon Okubo, an elder statesman, in the government of the third Tokugawa Shogun, Iemitsu (1623–51), who threw down his most cherished bonsai while admonishing his ruler. In modern times post-World War II Prime Ministers have been bonsai enthusiasts following the lead of Count Okubo of the 17th century and Kujoji Itoh of the late 19th century.

Records from the Edo Period (1615–1868) testify to the vogue of potted trees, and of such a kind as to rival the tulipomania of the 17th century Europe or the pteridomania of Victorian times. According to the knowledgeable Chuzo Onuki prices for potted trees went beyond bounds: “As an example, according to a publication of this period named *Koshienyawa*, certain trees were bought and sold at exorbitant rates according to the number of buds growing on them.”

Variegated forms of plants requiring potted culture became very popular at this time and aided the focus on the use of pots for trees and shrubs.

In the late 19th century the Meiji Restoration marked the beginnings of modern Japan. The country was opened to world trade and industrialization. Urban centers were born. Also at this time the influence of the literati painters, an aesthetic movement in the arts which interpreted nature in terms of human values and which was influenced by earlier Chinese art, was being felt. Small potted trees were natural objects for the expression of the *Nanga* forms and tastes. Although this school was centered in Kyoto and Osaka, the traditional cultural capitals of Japan, by the time of the turn of the century, members of the new political and cultural class centered in Tokyo were vying with each other in garden-making and bonsai culture. (This forms a parallel with the rivalries among the *nouveau riche* of New York society at about the same time.)

The early 20th century saw the formation of bonsai promotion groups with publications, auctions and exchanges. In October, 1927, bonsai from the Imperial Household Collection were exhibited at the public ceremonies held to honor the accession of Emperor Hirohito. This symbolic act reinforced in the public's mind the beauty and desirability of bonsai just as the Emperor Meiji's encouragement of the art had fueled the fad in an earlier era.

Perhaps one of the best sources for the verification of craft or custom is the record of the early travellers. In the case of the

Orient, which was truly opened to the West only during the 19th and 20th centuries, these records are a staple of historical research.

Among those curious and delightful accounts of Japan published early in this century, the daily record kept by Marie Stopes is one to read. Her observations rendered the incongruity of upper class life in Japan as measured against that which she knew in England: "He has also a fine collection of dwarf trees, and I watched one of his gardeners pruning a mighty forest of pines three inches high, growing on a headland jutting out to sea in a porcelain dish." This and other observations of the home of Count Okuma contain a subtle humor which as we look back on the Victorian parlor clutter and love of the material, sound outrageously judgmental. We must assume that Miss Stopes found the typical English drawing room of her day as incongruous. Later during a short illness, while describing the simple beauty of her room appointments, Miss Stopes mentions "a little bent and twisted tree" which grew in "a flat earthenware bowl."

When one thinks of travellers in the modern sense, Robert Fortune of the mid-1800's serves as a model. He travelled far and seemed to miss nothing along the way. But this detailing which in other men might be cause for skepticism has been largely verified by later visitors. Fortune's observations are most important since he was looking for plants to send back to England, and searched out nurseries and gardens. Cultivation of *Acorus* was observed using porcelain pots, and which with the addition of rocks containing mineral crystals formed an imitative landscape (the modern term in Japanese is *senkei*). Fortune characterizes the garden containing these as having "a novel and striking effect." This early phrase contains much of the essence of bonsai. He goes on: "In Japan, as in China, dwarf plants are greatly esteemed; and the art of dwarfing has been brought to a high state of perfection."

In the fall of 1843, Fortune visited Ning-po, continuing his voyage up the eastern coast. In visits to gardens of some of the Mandarins in this city he noted dwarf trees. Among these were also trees formed to resemble animals — a form of oriental topiary. The presence of bonsai in China at this time may be explained as indigenous. Trading from the east coast to Japan had been common for a thousand years, which may be another way in which dwarfing of trees became common in geographical regions of both countries. Fortune also observed culture techniques for dwarf trees and commented on the species used by

the Chinese. Fortune's acute observations on technique, long overlooked in the West, could be a succinct *vade mecum* for any fancier.

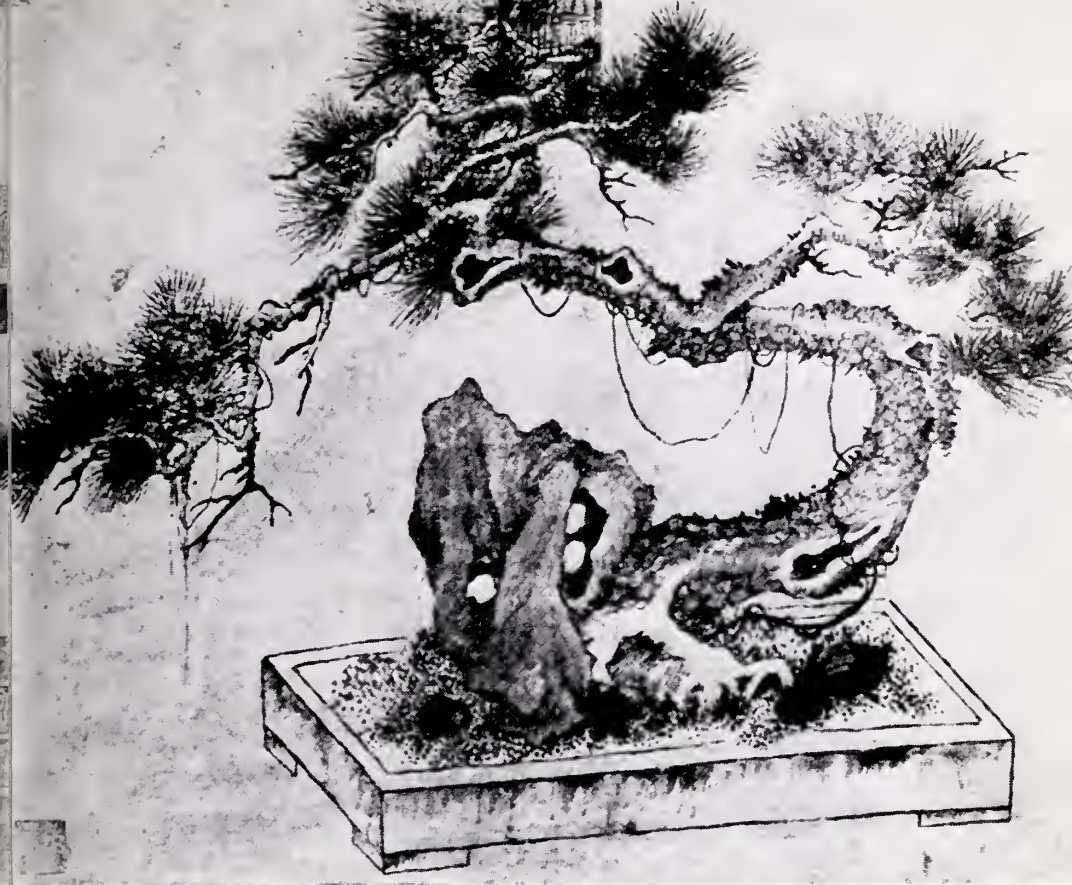
In the introduction to the narrative of the U.S. Expedition to Japan, Francis Hawks mentions the wonderful dwarfing skills of the Japanese: ". . . may be seen, in the miniature gardens of the towns, perfectly mature trees, of various kinds, not more than three feet high, and with heads about three feet in diameter. These dwarfed trees are often placed in flower pots. Fischer says that he saw in a box four inches long, one and a half wide, and six in height, a bamboo, a fir, and a plum tree, all thriving, and the latter in full bloom."

In the West little notice of bonsai was taken until the London Exhibition of 1909 when an exporter, Mr. Sato, brought a display collection from Japan. Later he held private showings in New York. This entrepreneurial activity may have been spurred by plants presented as gifts to officials by the Japanese, or by individual specimens brought back by devotees of the grand tour. Previous to this in the United States Leonard and Company of Boston had a four-day auction of over 450 plants imported by Yamanako and Company. These plants were advertised as "3 year acclimated" and were sold in antique Chinese and Japanese containers. In 1911 the Ernest Francis collection came to New York (now at the Brooklyn Botanic Garden) and in 1913 a collection of dwarf trees was exported to the United States for Ambassador Larz Anderson (later given to the Arnold Arboretum in 1937).

Many of the imported trees were doomed, since the literature available in western languages was sparse until the postwar period. (The stringent Federal Horticultural Board Embargo earlier in the century had dampened the enthusiasm for plant importation.) Short general articles appeared in the *Gardeners' Chronicle of America* in 1922, in the *Journal Horticole et de Viticulture de Suisse* in 1909 and in the *Tribune Horticole* in 1932. A perceptive article on the Larz Anderson Collection written by Elinor Guthrie appeared in the June 1937 issue of *House Beautiful*.

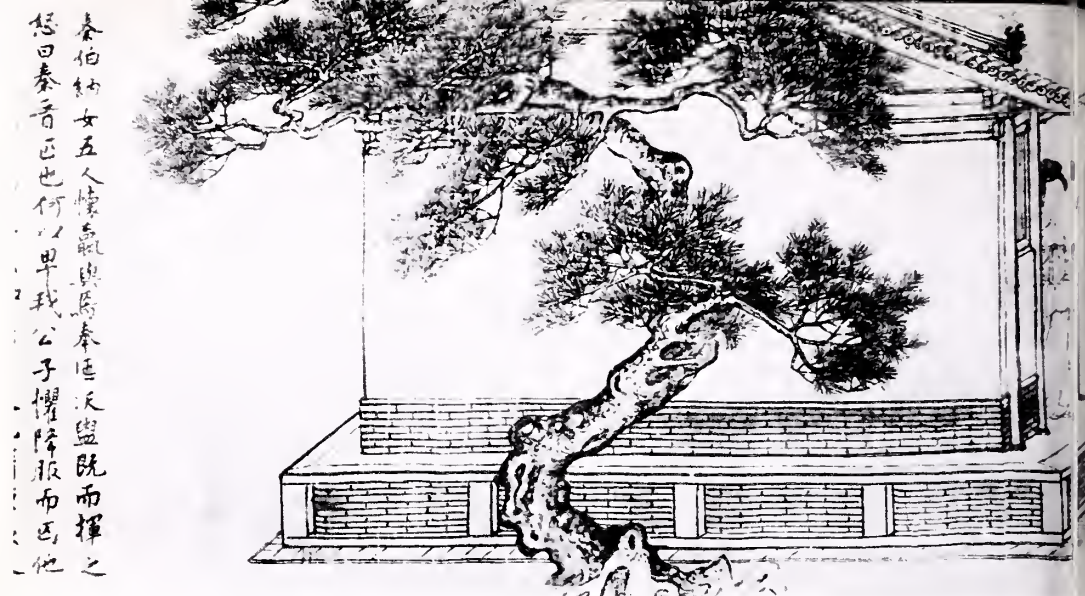
Information on techniques of growing were not readily available to the West until the mid-1950's and later. The charge of some popular writers that the techniques of dwarfing "have been clothed in secrecy by the orientals" is unfair. The lack of competent translated works was the real brake on popular acceptance by the gardening public.

But to turn to the third geographical area of interest in the



"The Drooping Pine" by Li Shih Hsin (Yüan Dynasty 1280-1368). From the collection of Mr. S. M. Siu of Hong Kong, in "Chinese Ancient Paintings Collected by S. M. Siu."

history of bonsai, we come to China. Bonsai are closely associated with Japan in the American mind. Many Japanese authors trace the word itself to growers in Azakusa Park in the mid-19th century of Japan. However we call them, bonsai or p'en tsai, it has become clear that the growing of small trees in pots has a long history in Japan and China. Further, it seems that the recent history of Japan and its close contacts with the United States has strongly influenced writers of popular works whose access to information on Chinese customs has been more limited.



Old tree, by an artist named Li Tang, the Southern Sung Dynasty (12th–13th century). From *The Pageant of Chinese Painting*, Otsuke Kogeisha, Tokyo, 1936.

The best evidence of Chinese antecedents for bonsai comes from scrolls and screens preserved to this day. For example from the Sung Period (960–1279) we have an unsigned work with figures seated about a table and a bonsai (*Pinus* sp.) in the lower left foreground [see *The Pageant of Chinese Painting*]. Other paintings from the Sung Period include *Lady at a Dressing Table* and *Children Playing with Tops on a Garden Terrace* by Su Hon-ch'en active about 1124–1162 AD.

From the Ming Period (1368–1644) there is an anonymous work which includes a bonsai as an interior feature of a household [see *Masterpieces of Sung, Yüan, Ming and Ch'ing Painting*]. A work by Ch'on Ying depicts large artfully trained trees in porcelain tubs flanking a stair (a work executed in Japan), and those of another work by the same artist show a tree kept small but with roots in the ground. Those in the small tubs are certainly bonsai in the modern sense.

The Ming paintings *Stories of Ladies* executed by Chin Ying are delightful vignettes of court life. Two of these depict bonsai which modern fanciers would be proud to own. The first shows a terrace scene where a lady is busying herself at a long lacquer table in front of a large screen; on the terrace and used by the artist as a focal counterpoint is an unmistakable bonsai. An-

other scene shows a garden with mother, maids and children; on a table are three bonsai in the modern sense along with a bowl of potted bulbs.

Another Ming work by Tu Ling Nei-shih describes a terrace scene with a bonsai as a table ornament.

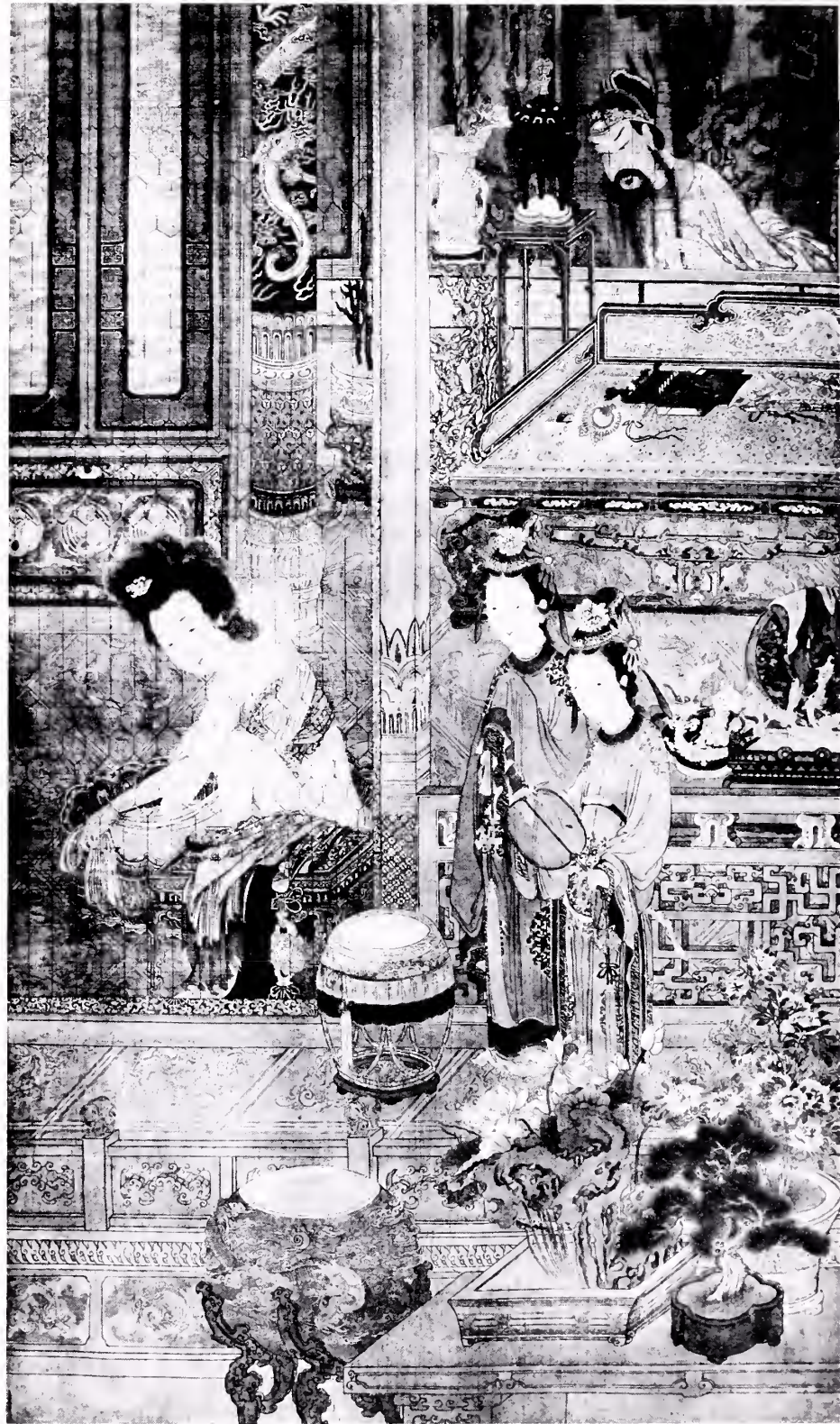
One of the best depictions of a bonsai of any age is that executed by Li Shih Hsin of the Yüan Dynasty (1280–1368). Called the *Drooping Pine* it is now in the collection of Mr. S. M. Siu of Hong Kong. Mr. Siu, a distinguished collector of art, has given permission to reproduce the photo of his treasure.

In the Ching Period (1644–1911) the artist Erh-Ch'i depicts a truly modern bonsai planted in a tray with rocks.

Due to the turbulence of Chinese political life in the late 19th century and after the death of the Empress T'zu-Hsi, evidence of bonsai as a Chinese garden art is sparse in western sources. However, Fortune's observations combined with much later observers gives us confidence that bonsai continued as a part of Chinese culture into modern times. Dr. F. A. McClure, noted botanist and teacher in China, reported on *A National Art Club Exhibit of Chinese Table Plants and Paintings* in 1930. Among those exhibited were species of *Casuarina*, *Paeonia*, *Juniper* and *Buxus*: "dwarfed in what is known in the West as the Japanese style." In the notice of an exhibition he refers to these "dwarfed plants and miniature landscapes" or "this peculiar form of Chinese art." Modern Chinese bonsai fanciers such as Mr. Wu Yee-sun of Hong Kong continue this time-honored art whose continued existence on the mainland is problematical.

There have been many reasons advanced to account for the popularity of small, trained, potted trees. The earliest records of potted trees are found in references to the ruling classes of China and Japan. At the courts in early cities, in temples and monasteries, men confined in restricted space needed reminders of nature. The trees may have carried religious sentiment but later became popular as ornamental objects. As cities became larger the need was even more pressing among those who could afford the art, especially in the river and coastal cities where rapid growth and agricultural needs denuded the natural vegetation. The merchant class emulated the hobbies of the ruling families. In modern times with mega-urbanization the cultivation of dwarf trees has been espoused by individuals from every social level, and, in many parts of the world.

The origins of bonsai may very well be traced to the T'ang Period of China. Verification in works of art go back to the Sung Period but it must be remembered it was only at that time



that artists depicted the courts, homes and gardens as a common theme. The custom, among many others, was adopted in Japan possibly as early as the Fujiwara Period (794–1192). The art has been in continual practice in both China and Japan for over 1,000 years and in Japan it is considered as an art on the same level as painting and sculpture. In the West the custom has become widespread only within recent memory.

It is difficult to define the appeal of these demanding tree forms. Perhaps the one common denominator which explains the lure of bonsai is their expressiveness of freedom. As man sees himself crowded by burgeoning populations and a rapidly narrowing ratio of square footage per person, the bonsai becomes symbolic, as it did in another context for the Buddhists, of a long-abandoned, far distant better time when man was a natural phenomenon in and not above nature.

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Ming Huang Peeping at Bathing Court Attendants. Anonymous. From Masterpieces of Sung, Yüan, Ming, Ch'ing Painting, compiled by The Fine Arts Academy, Tokyo, 1931.

Bonsai: Nature in Miniature

The 1914 Arnold Arboretum expedition to Japan led by Ernest H. Wilson produced, among other things, some excellent photographs which clearly show the natural inspiration for many of the forms of bonsai — that most specialized kind of Japanese horticulture. Pictures such as these can help put the hobbyist in touch with the source of his art and can be of particular importance to bonsai enthusiasts who wish to follow the Japanese models for bonsai but who do not have the experience of the Japanese landscape. The first part of this article is devoted to the relationship between nature and bonsai, and the last part of the article will relate some specific bonsai styles to such scenes as Wilson photographed in Japan in 1914.

A bonsai is a conscious attempt to suggest a natural scene. The first bonsai — and still the ideal of bonsai — were a part of nature. They were naturally dwarfed old trees dug and brought home to grow in containers in the collector's garden. Though the trees were of interest in themselves, their real beauty lay in their capacity to suggest the total landscape from which they had come. The gnarled and bleached old tree, potted and growing in the serenity of a garden, not only gave evidence of its struggle to survive but also suggested by its form the cliffs to which it had clung, the valley below the cliffs, the river in the valley, and perhaps the wind which had so tortured its branches.

All of the forms of bonsai have a natural model. Each different kind is intended to take the viewer back to the great tree, the forest, or the island-dotted vista which inspired it. If a particular creation cannot transport the viewer into the total landscape, it is esthetically less than it should be.

As the practice of the art of bonsai has spread from Japan to other parts of the world, its direct connection with the landscape which inspired its traditional forms has lessened. Although this separation has been remedied somewhat by relying on native plants and landscapes for inspiration, especially in semi-tropical and tropical areas, most bonsai hobbyists still prefer to emulate the classical styles and scenic compositions of the Japanese.



Fig. 1. Pinus parviflora. Slopes of Adzuma-san. Uzen Province. Photo: E. H. Wilson, 1914.



The result is that many bonsai are created in the image of other bonsai, copies of copies, and not in response to an immediate environment.

Photographic studies of the Japanese landscape can help the bonsai enthusiast recapture the source and spirit of his art and understand that the rules of bonsai are derived from nature — that, in fact, faithfulness to a natural model is the first rule of bonsai. Without a knowledge of the natural model, the bonsai hobbyist is likely to be a technician bound by convention. With a knowledge of the natural model, he has a context in which he can understand the “why” of the techniques he has learned. This will give him a basis to make his own judgements with confidence, and show him what a large range the bonsai artist has for expression if nature is his teacher and he has eyes to see.

Single Trees as Models

The most basic style of bonsai is the formal upright. A bonsai trained in this style has a perfectly vertical trunk with clouds of foliage sweeping alternately left, right, and to the rear. The three Japanese white pines (*Pinus parviflora*) in Fig. 1 are good examples of the kind of trees which a bonsai in the formal upright style means to suggest. The trees tower over the landscape, each magnificent in its own right.

In contrast to the formality of the pines in Fig. 1, the *Pinus thunbergii* in Fig. 2 is more sinuous and graceful though no less impressive as a single tree. These qualities in a bonsai would classify the tree as an informal upright. The growing top of the tree is more or less directly above the base of the tree (upright), but the curving lines of trunk and branches are “informal.”

Multiple Trees and Forest Plantings

Bonsai plantings which contain more than two trees are called *Yose-ue*. Look again at Fig. 1. The relative heights of the three trees and their place in the composition of the photograph could serve as a model for a *Yose-ue* planting and suggest such a landscape as Wilson saw.

A group planting, however, need not suggest an entire landscape. The three Japanese red pines (*Pinus densiflora*) in Fig. 3 are more impressive planted together than either one would be alone. Two or three small trees which are undistinguished by themselves may look quite handsome in composition. Visible proof of the age of the trees in the photograph is supplied by the vestiges of dead limbs which project from the trunks.

Fig. 2. *Pinus thunbergii*. Village of Shitogo behind Yakushima.
Photo: E. H. Wilson, 1914.



Fig. 3. *Pinus densiflora* with torii at base of Kirishima. Photo: E. H. Wilson, 1914.

Top: Fig. 4. *Pinus densiflora* forming pure woods. Northern slopes of Fuji-san, Yoshida, Shruga Province. Photo: E. H. Wilson, 1914.

Bottom: Fig. 5. Remarkable cliffs of gray sandstone with *Pinus thunbergii*, near Matsushima. Photo: E. H. Wilson, 1914



Such remains of dead limbs, called *jin*, are often left or created on bonsai to enhance the illusion of age.

Wilson's photograph of a Japanese red pine forest (Fig. 4) contains two of the elements which one expects to find in a bonsai forest planting — the illusion of depth and triangular groupings of the trees. Depth in the photograph is an illusion too. The trees in the background are not small; they are simply farther away from the photographer than the trees in the foreground. That same illusion of depth can be created in a bonsai forest planting by placing the tallest trees toward the front of the container and sharply decreasing the height of the trees toward the rear of the planting.

Nature arranged this forest, and the bonsai hobbyist can take a lesson from the triangular scheme of composition which appears in the photograph. The tallest tree is forward in the composition and forms a triangle with the tall trees on the left and right of the main tree. Other trees in the picture fill in between the principal trees and form triangular sub-groupings with the ones on the left and right, uniting the entire composition.

Islands and Rocky Cliffs

Ishi-tsuki is a style of bonsai which combines plant material and stones into compositions which present a miniature landscape, the rocks serving as landscape features as well as the container for the plants. Two of the most popular features of the terrain to reproduce are rocky cliffs and small islands.

Fig. 5 shows a group of sandstone cliffs at a seashore. The photograph is a good guide for selecting the appropriate material to reproduce the scene as a bonsai composition. The rocks have a vertical orientation and are angular but smooth — evidence of the work of waves. The plant material is sparse, weathered, and tenacious. Notice the Japanese black pine (*Pinus thunbergii*) clinging to one of the cliffs as if it had been planted there and trained by some bonsai master. The composition would be displayed in a shallow, water-filled tray — a bonsai sea.

The photograph of the island (Fig. 6) as an *ishi-tsuki* model is equally instructive. The stone used to represent the island

Fig. 6. *Pinus parviflora*. Lake Towada, Northern Hondo.
Photo: E. H. Wilson, 1914.

Fig. 7. *Larix gmelini* showing effects of strong winds from Sea of Okhotsk.
Photo: E. H. Wilson, 1914.



should be horizontally oriented and rough-textured in contrast to its placid sea. The plant material can be copious, varied, and lush. Since the silhouette of the composition is important, the "trees" on the island should have an open appearance so that each is distinct against the background of sky and water. Ornament is appropriate in such a composition; the small house in the picture is a pleasing addition to the scene.

Special Landscapes

The trees which grow in winds blowing constantly from one direction reflect that pressure in their shapes. The grove of Dahurian larches (*Larix gmelini*) in Fig. 7 clearly show in their wind-swept branches the direction of the prevailing winds. This is one way in which nature contorts her natural forms, and is the inspiration for the wind-swept style of bonsai. A bonsai in this manner is trained so that its trunk and branches sweep in one direction, bent by the pressure of an imaginary, but constant, wind.

Conclusion

Although a grove of American beeches can be as instructive to the bonsai hobbyist as a grove of Japanese red pines and the coast of Maine as suggestive of scenic bonsai as Japan's Inland Sea, it is nevertheless valuable to examine the wellsprings of the art of bonsai. Such an examination can help to recouple the link between nature and bonsai. That done, the hobbyist can hopefully see new forms and material around him. Or, if he chooses to follow the Japanese models, he can do it with understanding. Either way his art will be less detached, less artificial, and nearer to the goal of nature in miniature.

DONALD M. VINING



PLANTS
IN
EARLY
JAPANESE
POETRY



No matter what the motive — religious, horticultural or artistic — the Japanese have always treated plants with a special reverence. An intense appreciation of plants is evident in the magnificent Japanese gardens, Shinto shrines, paintings, and especially in Japanese poetry. From the earliest Japanese writings to the present day, in fact, plants are the most dominant single motif in all of Japanese poetry. To appreciate the remarkable continuity of this traditional subject, it is valuable to look at plants as they first appeared in Japanese literature. The two oldest extant Japanese books, the *Kojiki* and the *Manyoshu*, can tell us a great deal about the early attitudes towards, and uses of, certain plants.

The *Kojiki*, completed around 720 A.D., is Japan's earliest "Record of Ancient Matters." It is a compilation of myths, legends and songs as well as an "official" genealogy which established exactly who was related to the Emperor for the purpose of providing correct favors from the throne. The *Manyoshu*, completed about 780 A.D., only sixty years after the *Kojiki*, is Japan's earliest anthology of purely Japanese poetry. Both books contain court poetry as well as poetry and songs that obviously have a humble origin.

Plants are referred to in three important ways in these books: first, as useful objects in eighth century culture in Japan; second, as analogies to describe human feelings or beauty; and third, as a source of comfort and wisdom.

*Useful plants.**

Aside from providing food, plants also supplied eighth century Japan with a wide variety of useful items. Cryptomerias were used for building boats (*Kojiki* II: 102: 5). Countryfolk used the thick leaves of the evergreen *Castanopsis cuspidata* as "bowls" for rice (*Manyoshu* II: 141-2). A very large oak, *Quercus acutissima*, provided elegant leaves which were used

* Japanese, Latin, and English names are identified in a list at the end of this paper.

as cups at banquets (*Kojiki* II: 102: 5). The cups from the acorns of this same oak provided a greyish dye for clothing (*Manyoshu* MXVIII: 4106–9). Another dye was obtained from the juice of the atane plant (*Kojiki* 27: 21–25). Several textiles were woven from plant fibres. For instance:

Under silken curtains,
The fluffy ones,
Under covers of MUSI fibres,
The soft ones,
Under cover of TAKU fibres,
The rustling ones,
You will embrace
With your arms
White as a rope of TAKU fibres.

(*Kojiki* 28: 19–29)

Taku refers to the fibres made from the tree popularly known as the paper mulberry, *Broussonetia papyrifera*, which is not a mulberry but is in the mulberry family, and has had a long history of material use for humans. In ancient times a particularly strong paper made from its bark was used for deeds in China; in modern times it is used for stencils because of its capacity for holding the necessary wax material. Strong, thin, and flexible rope and textile fibres can also be made from the bark. *Taku* fibres are still used as comfortably warm and flexibly sturdy lining material for silk, hence making it possible to wear quite delicate-looking silks in the worst of winters. The paper mulberry, however, is not particularly attractive and has an aggressive growth habit. The Japanese consider it a rather unaesthetic weed. Hence, though they might use its bark for strong white paper to write a poem to a pine or cherry tree, the paper mulberry itself has probably never been considered the subject for such a poem, much less a plant for anyone's garden. Its usefulness is its only merit.

Plants used as analogies to describe human feelings or beauty. Most of the poetic similes and metaphors that appear in the *Kojiki* and *Manyoshu* are related to specific plants. For example:

Her teeth were white
Like SIPI acorns, like water-chestnuts.

(*Kojiki* II: 101: 32, 33)

Or, in reference to the "pepper plant":

Beneath the fence
Grows a pepper plant.
It burns the mouth;
Like this sting, I will not forget,
But will smite them relentlessly!

(*Kojiki* II: 52: 32-38)

And again, in reference to this period's ideally docile wife:

Your head drooping,
Like the lone reed of Susuki grass
On the mountainside.

(*Kojiki* I: 27: 39-41)

The conventional Japanese epithet for the young wife is, in fact, that she is "like the young grass" (*Kojiki* I: 27: 46, 47). The susuki grass, or *Miscanthus sinensis*, is an autumnal flower that grows profusely on the mountainsides in the warmer regions of Japan. Like the ideal Japanese wife of this period, the susuki is not particularly elegant, but is very graceful when it flowers and "droops" itself on the mountainsides. Willow trees and bamboo stems also have a pliant gracefulness which can be used in poetry to describe the ideal wife:

Beauty was hers that glowed like autumn
mountains
And grace as of the swaying bamboo stem.

(*Manyoshu* II: 217-9)

The ideal concubine, on the other hand, is described in terms of the tatibana (wild orange) tree:

Its upper branches
Are withered by the birds' nesting;
Its lower branches
Are withered by the people's plucking
But the three-chestnut
Middle branches
Like these best branches
Is the ruddy maiden . . .

(*Kojiki* II: 102: 6-19)

Often certain plant images are used to glorify the Emperor. For instance, when a mistress of the court is about to be executed for having let a leaf fall into a cup being presented to the Emperor, she saves herself by comparing the grandeur of the tall



Albizia julibrissin. Photo: P. Bruns.

elm tree with the stature and divine generosity of the Emperor:

Its upper branches
 Spread out over the heavens:
 Its middle branches
 Spread out over the eastern lands:
 Its lower branches
 Spread out over the rural regions.
 The leaves at the tip
 Of the upper branches;
 Touch down
 On the middle branches;
 The leaves at the tip
 Of the middle branches
 Touch down
 On the lower branches;
 Drop, as floating oil
 Into the beautiful jeweled cup
 Presented
 By the girl of Mipe.

(*Kojiki* III: 133: 35-54)

Plants as a source of comfort and wisdom

Nature is never seen as a threatening or malicious force in the *Kojiki* and the *Manyoshu*. Plants are treated with a sense of affinity and awe. In both the *Kojiki* and the *Manyoshu*, for instance, we find poems addressed directly to solitary pine trees. A young hero in the *Kojiki* is on his way to a decisive encounter with a great white boar; he sings, perhaps wistfully, for he will need help of some kind in this endeavor:

O lone pine,
Were you a man,
I would give you a sword to wear,
I would dress you with clothes,
O lone pine
—O my brother!

(*Kojiki* II: 86: 13–23)

This sense of kinship with the pine tree grows into veneration in the *Manyoshu*. A certain prince admires the age and constancy of the evergreen:

O solitary pine, how many
Generations of man have you known?
Is it because of your great age
That the passing winds sing in so clear a tone?
(*Manyoshu* VI: 1042)

Veneration for an aging parent is often expressed through images related to the longevity of the conifers:

Flourish, my noble mother
Like the pines and junipers.
(*Manyoshu* XIX: 4169–70)

About the most treacherous natural event in the *Manyoshu* is when the autumn leaves, which are nonetheless flying about magnificently (*Manyoshu* II: 135–7), prevent the poet from seeing his wife's home. The events most often remembered by a surviving spouse are the moments shared with nature, when they went to look at the elm trees in autumn (*Manyoshu* II: 210–2) or were "Bedecked with flowers in spring" (*Manyoshu* II: 196–8). A dead husband or wife may be remembered by certain flowers in a garden:

The fringed pink in my garden
Which my beloved planted
For her remembrance in autumn-tide
Has all come out in bloom.
(*Manyoshu* III: 464)

It is significant that plantlife is seen, without exception, as a constant source of comfort and concern.

When so little of his life remained,
 He asked, 'Are the bush-clovers
 Yet in flower?' — Alas, my master!
 (*Manyoshu* III: 455)

Certain plants take on symbolic meanings which need only be mentioned in the poetry in order to conjure up specific associations. For instance, a Lady writes to her lover:

The silk-tree that blooms in daytime
 And sleeps the love-sleep at night,
 Your lady should not see alone.
 Look well on this, my slave!
 (*Manyoshu* VIII: 140-1)

This silk-tree is the highly treasured *Albizia julibrissin*. It is a graceful tree, whose twice-compound leaves grow in such a way that there is never an odd number of leaflets on any rachis. As the poem states, the tree blooms in the daytime; at night the leaves fold up, two by two, signifying couples sleeping together.

Each season brings the delights of new sensations which are linked with certain plants. Early spring is celebrated with poems welcoming the plum blossom. The plum tree's rough, rugged trunk and angular branches have blossoms that look strikingly fragile in comparison, especially since they often bloom while snow is still on the ground.

When with the first month comes the spring,
 Thus breaking sprays of plum-blossoms,
 We'll taste pleasure to the full.
 (*Manyoshu* V: 815)

The luscious and thick-smelling cherry blossoms appear later in the spring. Cherries are dazzling when in bloom, but the flowers fall quickly; hence the Japanese poems about cherry trees often express a certain melancholy.

I thought I would wear it
 When the spring came —
 Alas, my 'cherry flower'
 Is fallen and gone!
 (*Manyoshu* XVI: 3786-7)

The apotheosis of plant appreciation is the following poem about autumn from the *Manyoshu*:

The flowers that blow
In the autumn field
When I count them on my fingers,
There they are —
The flowers of seven kinds.

The 'tail flowers,' the flowers
Of the kuzu vine and patrinia,
The fringed pink, and the agrimony,
And last the blithe 'morning face.'
(*Manyoshu* VIII: 1537-8)

The 'tail flower' is the *Miscanthus sinensis*; its color is generally yellow, with some white and purple. The Kuzu vine, or *Pueraria lobata*, is a creeping vine with reddish-purple flowers. *Patrinia scabiosaefolia* is a yellow wildflower, often as tall as three to four feet. The 'hemp agrimony,' or *Eupatorium chinense* var. *simplicifolium*, is a member of the chrysanthemum family, though its flowers are generally smaller than the normal chrysanthemum. It has a particularly strong, pungent odor, often used for rich perfumes. By simply listing certain plants the poet has created for the Japanese reader many sights, smells and connotations related to autumn.

The *Kojiki* and *Manyoshu* mark the beginning of a long poetic tradition which focussed its thoughts and feelings on plantlife and the changing of the seasons. This tradition is not confined to poetry, though Japan's poetry developed a few centuries before her painting. In this tradition we see the Japanese poet at one with his natural environment and with the plants that grow in it.

SALLY LINDFORS SULLIVAN

Acknowledgments

Dr. S. Y. Hu, Arnold Arboretum, provided much ethnobotanical information, particularly about the paper mulberry and hardy silk-tree. Also thanks to: Dr. E. A. Cranston and Dr. E. Bruce Brooks, Department of Far Eastern Languages, Harvard University; Pat Shen, Museum of Fine Arts; Louise Cort, Fogg

Art Museum; S. Sutton and E. Bernstein, Arnold Arboretum; K. Roby, Gray Herbarium; George E. Potter, Harvard-Yenching Institute; Dr. Gordon P. DeWolf, Jr., Arnold Arboretum.

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JAPANESE, LATIN, AND ENGLISH NAMES OF PLANTS IN EARLY JAPANESE POETRY

- Cryptomerias — *Cryptomeria japonica* (L.F.) D. Don = Sugi.
Castanopsis cuspidata (Thunberg) Schottky = Tsubura-jii
Quercus acutissima Carruthers = Kashiwa
 Atane — *Rubia cordifolia* L. var. *munjista* Miq. = akane
 Mushi — = mushi = *Boehmeria nivea* Gaudichaud = Ramie
 Taku — *Broussonetia papyrifera* (L.) Vent.
 Pine — = matsu
 Cherry — = sakura
 Sipi — = shii = Mateba-shii = *Pasania edulis* Makino or
 Tsubura-jii = *Castanopsis cuspidata* (Thunberg) Schottky
 Water-chestnut — = Hishi = *Trapa japonica* Flerov. or = shiro-
 guwai = *Eleocharis dulcis* (Burman f.) Trin.
 Pepper plant — = hajinami = Asakuran zansho = *Zanthoxylum*
 piperatum DC. forma *inerme* (Makino) Makino
 Susuki grass — *Miscanthus sinensis* Anderss.
 Tatibana — = Tachibana = *Citrus tachibana* (Makino) T.
 Tanaka
 Three-chestnut — = mitsu-gure probably = Kuri = *Castanea*
 crenata Sieb. and Zucc.
 Fringed pink — = nadeshiko = *Dianthus superbus* L.
 Bush-clover — *Lespedeza* spp. = hagi

Silk tree — *Albizia julibrissin* Durazz. = Nemu-no-ki

Plum tree — = ume = *Prunus mume* Sieb. & Zucc.

Morning face — = asagao = *Ipomoea nil* L.

Tail flower — = susuki = *Miscanthus sinensis* Anderss.

Kuzu — = Kudzu = *Pueraria lobata* (Willd.) Ohwi

Patrinia — = Omina-eschi = *Patrinia scabiosaeifolia* Fisch.

Agrimony — = Hiyodoribana = *Eupatorium chinense* L. var. *simplicifolium* (Makino) Kitam.

GORDON P. DEWOLF, JR.

GEORGE E. POTTER

E. BRUCE BROOKS



The art of dwarfing trees, as commonly practised both in China and Japan, is in reality very simple and easily understood. It is based upon one of the commonest principles of vegetable physiology. Anything which has a tendency to check or retard the flow of the sap in trees, also prevents, to a certain extent, the formation of wood and leaves. This may be done by grafting, by confining the roots in a small space, by withholding water, by bending the branches, and in a hundred other ways, which all proceed upon the same principle. This principle is perfectly understood by the Japanese, and they take advantage of it to make nature subservient to this particular whim of theirs. — Robert Fortune in "Three Years' Wanderings in the Northern Provinces of China." V. 2. 1847.

Notes from the Arnold Arboretum

Japanese Theory — American Practice

Mrs. Constance E. Derderian is Honorary Curator of Bonsai at the Arnold Arboretum, is a director of the American Bonsai Society, and has worked with bonsai for many years. She has studied at the Brooklyn Botanic Garden with Frank Okamura, Kan Yashiroda, Lynn Perry, and others. In 1967 her studies took her to Japan where she had the opportunity to study with Kyuzo Murata. Mrs. Derderian is a leading authority on Bonsai in the northeastern part of the United States, and is well known throughout the country. She writes, lectures, and teaches classes in bonsai.

In 1969 Mrs. Derderian was asked by the Arnold Arboretum to direct and carry out a program of pruning and re-potting the Larz Anderson collection of bonsai. Mrs. Derderian describes below one of the incidents which took place during the delicate operations. *Ed.*

For many years I have been interested in the bonsai of the Arnold Arboretum. Now I had been asked to do the job of pruning and re-potting the collection. I was apprehensive, but I wanted above all to help the Arboretum care for its bonsai. Fortunately Robert Hebb, Assistant Horticulturist, and Henry Goodell, Head Pruner and Assistant Superintendent, were assigned to help me. We worked in the greenhouse by the desk of Alfred Fordham, Propagator, so the bonsai were not abandoned to a total stranger.

The first of the five large *Chamaecyparis* presented a problem immediately. The tree is about three and one-half feet tall and the root ball, out of the container, measured about twenty inches in width and twelve to fourteen inches in depth. The trunk had split vertically at the base, severing the lowest branch on the right. The split began above the branch and extended down to the soil. When the tree was moved the branch wobbled badly. Bob and Hank both said it would have to be cut off! I couldn't bear it. The branch had such interesting form and was definitely alive and in good health. We called Al over and I explained the theory of cutting pie-shaped wedges from the soil ball of old bonsai in order to renew the roots. I suggested that



we cut a wedge but begin the cuts at either side of the split at the base of the trunk. Then there would be a possibility of taking the roots which were feeding that branch. The result would be a 175 year old bonsai in half an hour.

The problem was that although I knew the theory well I had never had an opportunity to practice it. This was a larger wedge than was recommended. If it were too large we risked killing the large tree. If too small a wedge were taken, or there were not enough root structure, the branch would be lost. After a discussion the unanimous decision was to test the theory. I marked the wedge and began to cut, but the huge root ball was too much for me. Bob took over and neatly and carefully, with a very thin root-saw, cut the wedge away from the root ball. We had cut away as small a wedge as we dared but after it was cut it looked huge! Two years before while in Japan I had bought a very handsome old bonsai container, not because I had a use for it, but because it was beautiful. It was perfect for the new tree. In my excitement I knocked it off the table and it shattered. We had to use a shorter container which was too

heavy for the graceful lines of the branch, and too narrow to allow proper placement, but it was all we had.

We potted up the "tree" and Hank went to work skillfully smoothing up the ragged edges of the split and carving out the soft spots. There was only a narrow strip of living tissue connecting branch and root so it was important to leave as much support as possible. The part of the main trunk which was still attached was cleaned and allowed to whiten like the broken parts of trees in nature. Hank also made a crutch from pruned materials to use Japanese style to support the extending part of the branch.

We had done all we could at that time. We offered the misfortune of the broken container to the evil gods, and put the new-old bonsai into the care of the greenhouse staff.

Two years later the larger tree is thriving. The smaller tree is beginning to fill out and makes one of the most interesting trees in the collection. The theory which I had learned in Japan, plus American knowledge of growing plants, had worked together to save both the old tree and its branch.

CONSTANCE E. DERDERIAN



Correction

The caption for the picture of *Syringa chinensis* which appears on page 117 of the May issue of *Arnoldia* should read "*Syringa chinensis* at Highland Park, Rochester, New York."

Propagation of Some Aged Bonsai Plants

The Arnold Arboretum bonsai, some of the oldest and largest specimens of bonsai in the United States, were imported more than half a century ago. Through the years changes have taken place in the characteristics of the plants, and early in 1969 it was decided to have a program of renovation.

The ensuing alterations of *Chamaecyparis pisifera* 'Squarrosa' (Moss cypress) and the *C. obtusa* cultivars (Hinoki cypress) led to the removal of excess parts which provided propagating material. Ordinarily propagation of these subjects would have been done in autumn, but pruning the bonsai took place in March so the cuttings were processed at that time.

Chamaecyparis pisifera 'Squarrosa' (Moss cypress). A Fixed Juvenile.

When plants are grown from seeds, characteristics which appear on the young seedlings often differ greatly from those which are found later in the plant's life. In the case of conifers, the first or juvenile growth is gradually replaced by mature growth thereby leading to a normal plant. The interval between the advent of maturity and the time of flowering and fruiting has been termed the "adolescent phase". These stages represent the normal course of events in the development of conifers.

However, in some conifers particularly in the genera *Chamaecyparis* and *Thuja* the juvenile to adult transition may fail to take place and some plants remain in the juvenile phase. These have been termed "fixed juveniles". Plants which remain physiologically juvenile also retain a trait associated with the seedling stage — the ability to root readily.

Chamaecyparis pisifera 'Squarrosa' is a fixed juvenile. The cuttings taken from our 75 year old bonsai plant, which is 30 inches tall, rooted easily. When propagating conifers at the Arnold Arboretum cuttings of large size are preferred. Figure 1 illustrates plants which arose from rooted cuttings of our 75 year old *C. pisifera* 'Squarrosa'. They have grown but little since being potted and the multi-branched framework which is evident was present when the cuttings were made. Each cutting consisted of at least several years' growth.

Thirty cuttings were divided into two equal lots. These were inserted in a polyethylene plastic propagating chamber. A

medium consisting of one-half sand and one-half Perlite was used. Lot #1 was treated with a root-inducing substance containing 0.8% indolebutyric acid in talc with the fungicide Thiram added at the rate of 15%. Lot #2 was treated with a liquid formulation of indolebutyric acid plus naphthalene acetic acid at the rate of 5,000 ppm each. In both cases 87% of the cuttings produced excellent root systems.

Chamaecyparis obtusa (Hinoki False Cypress)

Seven unnamed cultivars of *Chamaecyparis obtusa* from the original Larz Anderson gift are in the Arboretum's bonsai collection. They range in age from 105 to 230 years.

When raised from seeds *Chamaecyparis obtusa* has given rise to numerous dwarf and slow growing forms. The Arboretum's bonsai plants are not typical of the species and must have originated as seedling mutations or from propagules of such mutations.

Figure 2 shows rooted cuttings of *Chamaecyparis obtusa* which were started in March of 1969. They, too, were made from multibranched cuttings consisting of several years' growth. The following table shows two methods by which the cuttings from three plants were treated together with percentages of success.

AA	Accession	Number	Treatment	% of Rooting
122-69	Lot #1		HRC*	72
	Lot #2		245TP**	48
124-69	Lot #1		HRC	80
	Lot #2		245TP	90
133-69	Lot #1		HRC	76
	Lot #2		245TP	59

*HRC — Powder formulation of 0.8% indolebutyric acid in talc with the fungicide Thiram added at the rate of 15%.

**245TP — Powder formulation of 245-trichloropenoxypropionic acid at the rate of 1,000 ppm in talc.

ALFRED J. FORDHAM



Fig. 1. Plants of *Chamaecyparis pisifera* 'Squarrosa' propagated from a 75-year-old bonsai. The multi-branched framework which is evident was present when the cuttings were made. Photo: Alfred J. Fordham.



Plants of *Chamaecyparis obtusa* var. rooted from multi-branched cuttings consisting of several years' growth. Photo: Alfred J. Fordham.

DR. DONALD WYMAN RECEIVES SCOTT AWARD

The following news release from Swarthmore College will be of interest to the readers of *Arnoldia*:

June 1, 1971

Donald Wyman, honored as "a man whose devotion to horticulture has been absolute" is the recipient of The Arthur Hoyt Scott Garden and Horticulture Award of \$1,000 and a round medal with a man cherishing and cultivating the ground on one side and the tree of life on the other. The Scott Award was accorded Dr. Wyman by a special committee chaired by Swarthmore College President Robert Cross.

Dr. Wyman, Horticulturist Emeritus of the Arnold Arboretum of Harvard University, has continued his horticultural activities since his retirement from the Arboretum last year. He is the author of five books, three of which have become standard reference works: *Shrubs and Vines for American Gardens*; *Trees for American Gardens*; *The Arnold Arboretum Garden Book*; *Ground Cover Plants*; and *The Saturday Morning Gardener*. In addition, in 1970 he published a garden encyclopedia, and he has contributed more than 1000 articles on woody plants to major horticultural publications of the U.S. and Europe.

In his career of advancing knowledge of horticulture, Dr. Wyman has served as president and director of the American Horticultural Society and of the American Association of Botanical Gardens and Arboreta. He has been a director of the American Institute of Park Executives and trustee of the Massachusetts Horticultural Society, of which he is now an honorary trustee. He has lectured widely and is the recipient of numerous other American and European Awards, including the Veitch Memorial Medal of the Royal Horticultural Society of Great Britain in 1969 and the George Robert White Medal of Honor of the Massachusetts Horticultural Society last year. Dr. Wyman graduated from Pennsylvania State College in 1926, and received his M.S.A. and Ph.D. in horticulture from Cornell University.

The Scott Award was founded in 1929 by Owen Moon, class of 1896, in memory of Arthur Hoyt Scott, owner of the Scott Paper Company and a Swarthmore graduate of 1895, who became treasurer of the American Peony Society and later a founder and treasurer of the American Iris Society. Given 17 times since 1930, the last time in 1970 to Dr. Aubrey Hildreth, the Award is designed to promote a deeper consciousness and love and a greater knowledge of plants, flowers, and gardening. In Moon's terms it is awarded by a committee chaired by the College President and composed of one representative each from the Horticultural Societies of Pennsylvania, New York, and Massachusetts, a nationally known garden or nature organization, a nationally known flower society, an editor in the general Philadelphia area, and two persons appointed by the Chairman. The medal is usually presented at the Commencement exercises of the College, although Dr. Wyman will not be able to attend.

The Arthur Hoyt Scott Foundation, which has offices at Swarthmore, maintains an extensive flower and tree collection on the campus.



Correction

The caption for the cover of the March issue of *Arnoldia* should read, "*Forsythia ovata* at the Arnold Arboretum."

Arnoldia Reviews

Ecological Studies. Analysis and Synthesis, edited by J. Jacobs, Munich; O. L. Lange, Wurzburg; J. S. Olson, Oak Ridge; W. Wieser, Innsbruck.

Vol 1. Analysis of Temperate Forest Ecosystems, edited by David E. Reichle.

Vol. 2. Integrated Experimental Ecology. Methods and Results of Ecosystem Research in the German Solling Project, edited by Heinz Ellenberg.

A new series of concise books will attempt to provide prompt world-wide information on approaches to the analysis of ecosystems and their interacting parts. Ecological studies will bring together methods or techniques of sampling and investigation and present results as well as hypotheses. *Analysis* will include biological, physical and chemical approaches while *Synthesis* will draw together scattered and new information to answer or clarify specific questions.

The two initial publications are part of the International Biological Program, a cooperative effort on behalf of the world's scientists to understand, through research and synthesis, the basic processes of environmental systems which support life on this planet.

Volume 1, Analysis of Temperate Forest Systems, is a collection of well-edited and coordinated papers presented at a workshop-seminar held in Gatlinburg, Tennessee, in 1968. The objectives of this meeting were to summarize much of the existing data and to establish a conceptual framework for the analysis of an ecosystem while emphasizing the temperate deciduous forest. Eighteen papers by authors from nine countries are grouped into six basic topics, an analysis of an ecosystem; primary producers; consumer organisms; decomposer populations; nutrient cycling and hydrologic cycles. Well-selected bibliographies accompany each paper.

As an appendix the series editor has presented a geographic index of world ecosystem. The ecosystem outline ordination is slightly modified from that of the UNESCO Committee on Classification and Mapping. The end-papers are useful additions to the book. Inside the front cover is a map rendition in color, after Leith, of the predicted annual fixation of carbon for the land

masses and oceans of the world. The map inside the back cover is printed in black and white, with symbols and numbers modified from Bazilevich et al showing the continental ecosystem patterns and the reconstructed organic carbon in the live biomass prior to the Iron age.

Volume 2, *Integrated Experimental Ecology*, is subtitled "Methods and Results of Ecosystem Research in the German Solling Project." Solling is an area of forest and grassland near Göttingen, Germany. The research was begun in 1966 as one of the pilot projects of the IBP and involved scientists in a variety of disciplines. As the studies continue at the present time this series of papers by 33 German scientists represents a progress report and an opportunity to examine and compare the methods being used.

Both volumes are technical publications not designed for the browser. They are excellent summary publications of the methods of modern ecological studies and as such are fundamental for students investigating undisturbed units of vegetation. There is no indication of the eventual scope or duration of the series but one hopes that all of the work of the IBP program can be incorporated in this series for comparison with these excellent volumes on the temperate forest biome.

R. A. H.

Edited by David E. Reichle, *Analysis of Temperate Forest Ecosystems*. New York: Springer-Verlag. 1970. 304 pages, 91 figures. \$15.20.

Edited by Heinz Ellenberg, *Integrated Experimental Ecology*. New York: Springer-Verlag. 1971. 214 pages, 53 figures. \$16.80.

Flora of New Zealand, Vol. 2. Indigenous Tracheophyta. Monocotyledones except Graminaea, by Lucy B. Moore and Elizabeth Edgar.

New Zealand, although a small country, has a flora of great biogeographical interest and it is a pleasure to see in print the second volume of "Flora of New Zealand", making now available a modern floristic treatment of all, except the grasses, its indigenous vascular plants. On the death in 1957 of the late Dr. H. H. Allen, for many years director of Botany Division, Depart-

ment of Scientific and Industrial Research (D. S. I. R.), and prime mover behind the flora project, Dr. Lucy Moore of D. S. I. R. saw through the press the whole of volume 1 (dicotyledons and pteridophytes). She and her colleague, Dr. Elizabeth Edgar, have successfully produced an interesting and useful treatment of the monocotyledons.

The classification is based on that of Hutchinson and, apart from the grasses, there are included 22 families of monocots, the largest by far being the Cyperaceae with 167 species. For each genus and species there is a description and notes on distribution and for each species reference to the place of publication and citation of the most important synonyms. There is also a great deal of interesting information in notes, often lengthy, which might have been set in something larger than 6pt type. Reading these requires some concentrated effort. There are only 43 figures, 18 of these orchids drawn by Bruce Irwin, but the number of text figures and the rather extensive use of small type probably were dictated by the desire to keep the size, and price, down to a level at which the book could be readily available to students.

In addition to the keys, descriptions (based in general on both living and dried material), glossary and corrigenda to volume 1, there is a continuation from that volume of "Annals of Taxonomic Research on New Zealand Tracheophyta", a cross-indexed (by family and by author) bibliography of New Zealand systematic botany. Another valuable part of the book is an annotated list of chromosome numbers of native New Zealand plants.

The book has been nicely produced by the Government Printer and is well-bound with maps on both front and back end papers. In the preface it is noted that in 1965 the Botany Division library received from the New Zealand state lottery, the "Golden Kiwi", a grant of NZ£24,000 for the purchase of botanical periodicals, a truly enlightened use of lottery proceeds. The authors and the Government of New Zealand deserve congratulations on the production of this book.

E. A. S.

Lucy B. Moore and Elizabeth Edgar, *Flora of New Zealand*, Vol. 2. Wellington: Government Printer, 1970. NZ \$4.50.



ARNOLDIA *is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Massachusetts, U.S.A.*



ARNOLDIA

The Arnold Arboretum

Vol. 31, No. 6

Nov. 1971

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ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Mass. 02130

*Published six times a year: on the 15th of January,
March, May, July, September, and November*
Subscriptions: \$3.50 per year. Single copies, 60 cents
Second-Class Postage Paid at Boston, Mass.

Cover: Sand Pear (Pyrus pyrifolia). Photo: P. Bruns
Opposite: Road to Bussey Hill. Photo: P. Bruns





The Director's Report

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR
ENDED JUNE 30, 1971

It is generally difficult to say exactly when a botanical garden begins, for desires, ideas, plants, financial support and personnel are needed and each may be equally critical to its development. We mark the establishment of the Arnold Arboretum in 1872, when James Arnold, a merchant of New Bedford, Massachusetts, left one twenty-fourth part of his estate to the care of his executors. His gift, accepted as a trust by the officers of Harvard College, was the foundation of the Arnold Arboretum.

We are planning to mark 1972 as the Centennial Year of the Arnold Arboretum. A special program is planned for the spring, but noteworthy activities and meetings are scheduled throughout the year. The development of this program has occupied much of our time and energies, from changes on the grounds and in the living collections to special publications and much correspondence with possible participants.

We sincerely hope that many friends and colleagues, representing horticulture and botany, will join us in 1972 to share in an appreciation of the Arnold Arboretum.

Community and Professional Service

An arboretum is a conspicuous part of a community. It may be only a geographic area of green leaves and colorful flowers in proximity to the congestion of bricks and concrete, or contrastingly, through its staff it may serve a significant role in the welfare of the community associated with it. For all of its 100 years the Arnold Arboretum has been an oasis in the community of Boston. Always open to the public, it is indeed a place for many people to visit during the spring when the

plants are in flower or in the fall when the autumn color of the foliage makes it equally attractive.

The public service offered by the staff throughout the year may be less obvious. There are contributions in the many identifications of plant materials; the multitude of questions answered of a horticultural or scientific nature; the classes, lectures and tours; the collections it shares; and the pages of printed material in its own publications or in newspapers and other journals which are professionally as well as popularly valued by the recipients.

Two aspects of a growing service are worthy of mention in detail — the poison plant information service and the consultation offered ecology-minded citizens and organizations.

Boston, like other major cities, has a cooperative Poison Center operated in one of the city hospitals on a twenty-four-hour basis. Calls from citizens which concern the ingestion of or exposure to plant materials of a possible poisonous nature are referred to the Arboretum office during the normal working hours and to specific staff members at their homes at other times. On the average a dozen calls a day are received throughout the year. The task of identifying and evaluating the plant from the description given over the telephone by an anxious mother is indeed a challenge. While most calls involve non-toxic plants, there are serious situations demanding emergency treatment. The call from the emergency room of a hospital requires quick access to a taxonomist who may, in turn, refer to appropriate library volumes kept near the telephone. A few years ago all of the calls to the Arnold Arboretum were from Metropolitan Boston. Now, however, the long distance calls, even from out of state hospitals, are more frequent.

The phenomenal increase in the concern over the quality of our environment and the appearance of our cities and neighborhoods has been accompanied by the participation of many citizens and the financial support of their activities through federal, local and private funds. Soon every group faces the problem of what to do beyond the obvious picking up of debris. Almost everyone knows that a vacant lot can be made into a park, but how is the soil to be treated? What plants will grow there? How should they be placed? What subsequent maintenance is necessary? What are the best erosion control plants? Where can the needed plants be bought? Ultimately the questions become "Will you teach our group?" and "Do you have surplus plants we can have for our project?"

The most important item that the Arnold Arboretum has to offer an organization or individual is information. The members of our limited staff do have the qualifications needed in a large number of horticultural and botanical areas. However, it must be a matter of policy that we cannot organize groups of people, cannot direct all, cannot finance any, and can supply relatively few plants. Rather we work with established organizations, providing advice as to the practicality of their proposals, providing demonstrations and education within the Arnold Arboretum on the proper method of dealing with their problems, and then allowing the members of the organization to carry out their work. This help is given free of charge. In a few cases organizations have chosen to retain a member of the staff to assist them in more detail on his own time and terms.

During the year 1970-1971 members of the staff of the Arnold Arboretum have worked with the following organizations:

Parks and Recreation Department, City of Boston

The Mayor's Office of Cultural Affairs

School Department — teacher training and program department

Conservation Commission

Boston Redevelopment Authority

"Summerthing" Program

Metropolitan District Commission

Massachusetts Bay Transportation Authority

Brookline Conservation Commission

Cambridgeport T.R.E.E., Inc., Cambridge Model Cities Program

Harvard University, Department of Buildings and Grounds

Tufts University, Department of Buildings and Grounds

Boston College, Department of Buildings and Grounds

Regis College, Science Teachers' Workshops

Massachusetts Horticultural Society, "Bloom-in" program

APACA Roxbury-Dorchester Beautification Committee

Lower Roxbury Community Corporation

DARE (A "Halfway House" program for Boston teenagers)

Roosevelt Towers Residents' Committee, Cambridge

Delle Avenue Residents' Committee, Mission Hill area, Boston

Friends of the Boston Public Garden

Traphole Brook Protective Association

Town of Weston

Massachusetts Tree Wardens' Association

Children's Museum

Community Economic Development Program, East Boston

Several of these are self-supporting organizations. Some are community-organized groups which contribute or seek their own financing. One group has a renewable grant from the Federal Department of Health Education and Welfare. Three groups are actually beautifying vacant land or areas owned by Harvard University in their neighborhood.

It is clear that there is a desperate need for horticultural advice in the community which neither city nor private professional talent can meet. It is also clear that the Arboretum staff cannot do much more than it is doing currently, due to limitations in the number of its staff. In fact, if we are to continue or to increase our activities and contacts with the public sector of our society, it will be necessary to have a staff member with the clear sole responsibility of coordinating these activities with limited active participation in the work.

Horticulture

The word rejuvenation must characterize our efforts on the grounds of the Arboretum in Jamaica Plain and in Weston during the past year. The horticultural staff planted 371 specimens on the grounds in the fall of 1970 and an additional 501 were placed in the spring of 1971. These included 168 taxa new to our collections. The seasonal weather extremes were not severe in contrast to previous years and the collections are growing well. The planning, however, is mostly for the future appearance of the living collections.

An automatic irrigation system has been installed in the lawn in front of the Administration Building and in the newly regraded area to the south of it. Additional magnolias have been added to the collections in these areas and the badly damaged plants of *Prunus sargentii* were removed and replaced with smaller specimens. The hillside seen immediately upon entrance to the grounds has been planted with daffodils and scillas for naturalizing and more plantings are anticipated to increase the attractiveness of this area.

During the winter a large number of old stag-headed trees in the area of the *Leitneria* swamp were removed and a part of the area cleared will be used to bring together representative taxa of *Hamamelis*. The areas where we maintain collections of *Buxus*, *Cytisus*, *Erica*, *Calluna* and prostrate Junipers were expanded to receive additional plants. The rockery which had



Bonsai House. Photo: Alfred Fordham

been damaged by fire was cleared and protected by being enlarged and some replanting was completed. The sequential display planting of azaleas along Meadow Road has also been improved. After regrading, with relocation and replanting of many specimens, the area was given a heavy application of wood chip mulch. Wood chips from our own operations or acquired from other sources have proven to be the most effective mulch material currently available. A new and generous supply of animal manure has been obtained from a local stable and used judiciously.

The collection of dwarf conifers below the Dana Greenhouses required considerable attention. At the time of the original planting, it was expected that the individual specimens would increase in size, but some cultivars far exceeded expectations in their spread. Duplicate specimens were placed elsewhere on the grounds now that they are larger in size and less apt to be stolen. Through the efforts of Mrs. Derderian, about one third of the bonsai collection was repotted.

An aerial bucket, mounted on a special truck body, which had been on order for over a year, was finally delivered. The effectiveness of our pruners in this expensive piece of equipment indicates that it was well worth the investment. On the negative side, extensive damage was experienced from rabbits and other rodents during the past winter. The use of chemicals





Spring in the Arnold Arboretum. Photos: P. Bruns

as repellents on what seemed to be susceptible shrubs only stimulated the animals to attack other plants. Damage was heavy on species of *Chaenomeles*, *Malus*, *Cotoneaster*, *Hamelis* and *Ulmus*.

Fires from vandalism fortunately constituted only a nuisance. Although fifteen fires occurred which could not be handled by our own staff and required the fire department, only two were classed as severe in their damage to plantings or to soil surfaces. A theft of four specimens from the bonsai collection on a summer evening proved to be the work of juveniles. Through the alertness of a staff member and the cooperation of a detective agency the plants were located. Two were dead from neglect or improper care, but the two most valuable older plants from the Lars Anderson collections could be saved. Court action has not been completed.

One section of the Arboretum known as the South Street tract is low land with a pond of immediate interest as a wildlife area, which was reserved for future expansion of the collections after improvement in drainage, contouring and fencing. The area has been mentioned in previous reports when it was considered by city committees for school locations or recreational playgrounds. In 1959, as the result of an election, the land was to be taken by eminent domain proceedings, but the necessary legal action was never completed. In May of this year two small children were drowned when they fell from a raft they had constructed with material from a dump on adjacent city-owned property. There was considerable unfavorable newspaper publicity, reporting comments of local politicians. After serious consideration the pond was filled during the summer.

The record-keeping system was developed to reveal more readily information on the status of individual genera within our collections. The system shows in a tabular form the additions or losses within generic groups over a period of time. There was the usual continuing effort to maintain labels on all of the plants on the grounds of the Arboretum and to have all specimens accurately plotted on maps and recorded in card files. The extra effort devoted during the spring to having the records brought up to date anticipated the incorporation of our data within the inventory of the Plant Records Center. This center, sponsored by the American Horticultural Society, is developing a data bank on the holdings of the major botanic gardens and arboreta within North America. Our participation

will permit us to receive computerized print-outs of the inventory of the Arnold Arboretum at moderate cost and will eliminate the need for laboriously compiled catalogs.

The horticultural staff was involved in four flower show exhibits during the year. Mr. Fordham prepared an exhibit of fruits, seeds and seedlings, with information on methods of propagating or germinating such material, for an exhibition in Horticultural Hall in Boston and for the Spring Flower Show of the Worcester County Horticultural Society. A display of mulching materials and methods of composting vegetable material formed an exhibit at the City of Boston "Summerthing Bloom-in" held on the Fenway. The largest effort was an exhibit entitled "The Story of Forsythia" which covered 700 square feet at the 1971 Spring Flower Show of the Massachusetts Horticultural Society. Gold was the pervading color of this anniversary show. The plants selected were forced into bloom exhibiting the various kinds of forsythia. A table display of literature and herbarium specimens was manned by the staff as an information booth. Although the exhibition was executed with satisfactory results, it was obvious to the staff that we do not have the facilities to attempt again an exhibit of such magnitude.

Duplicate or supply plants from the nursery areas were again offered to the Department of Buildings and Grounds at Harvard as required by the indenture. The remaining material was given to members of the Friends of the Arnold Arboretum, special selections to Weston High School, Jamaica Plain High School, Wellesley College, the University of Rhode Island, the University of Massachusetts, the Massachusetts Audubon Society, Channel 2 WGBH auction, and to civic beautification groups. There were ten groups concerned with city improvement that received plant materials for their local projects.

There are problems in distributing surplus materials: the safety of the nursery must be considered, the material must be apportioned fairly, and it must be delivered in such a manner that it will survive. We do not have the staff to dig, ball, and assemble the material to be collected, nor can we permit individuals to help themselves. Miss Nancy Page, a Mercer Fellow, has served as a coordinator between the Arboretum staff and the interested groups. With the help of Mr. Kinahan, superintendent at Weston, and Mr. Vining, another Mercer Fellow, demonstrations were given on the methods of digging, balling, burlapping, pruning, replanting, watering, and general after-

care. Then the volunteers were permitted to prepare and remove the plants. Subsequent visits to the areas where these plants were taken revealed that the materials were used effectively and that approximately 99% success has been obtained in establishing these gift plants.

The greenhouses of the Arnold Arboretum are used for work in plant propagation, both for the maintenance of the living outdoor collections and for basic or experimental research of the staff. There are no display collections offered to the public within the greenhouses and the few general collections maintained are associated with teaching programs. At the present time there are the following diverse assemblages being used by the staff in their own research: Dr. Weaver is growing *Lisianthus*, *Calolisianthus*, and other members of the Gentianaceae. Dr. Wood has many plants from southeastern United States to provide descriptive and illustrative material for his generic flora project. Dr. DeWolf is attempting to establish new clones of *Ceratiola* and *Gardoquia*. Dr. Howard has many plants from mountain vegetation of the Greater and Lesser Antilles, including material recently obtained of *Solanum lobulatum*, a species never known in flower or fruit. Dr. Elias has material of *Hamelia* associated with his monograph. Dr. Schubert continues her interest in *Dioscorea* material from Mexico. Mr. Sousa-Sanchez has brought taxa of *Lonchocarpus* into flower from seed. The tolerance of the propagator to this usurpation of space is much appreciated.

The Centennial program of the Arnold Arboretum is planned to include the distribution of plant materials. Mr. Fordham and his staff verified a survey of the living collections to determine the condition of the plants which supplied the holotype specimens for taxa described by Sargent, Wilson and Rehder. A listing of 71 of these has been distributed to botanical gardens and arboreta, offering to them propagating material, i.e. budwood or scions, of type plants for their collections. The propagation staff has also grown specimens of twelve rare or unusual taxa of educational or teaching value to be offered to universities or colleges with strong departments of botany or horticulture. Another group of plants, more ornamental in nature, will be offered to garden clubs and horticultural organizations in New England. Finally, we plan to send a small plant by mail to all members of the Friends.

In addition to these special projects, the regular work of the propagating staff proceeded. Requests were received for materials from our collections from twelve countries, and 169 ship-



Alfred Fordham's Fall Class at the Arboretum. Photo: P. Bruns

ments of 800 taxa were made. We received, by our request, or in exchange, 253 shipments of 1214 taxa from 31 countries. Material received as seed included 694 taxa. Much of this was grown only for experimental data on germination, for cytological or morphological information, or for herbarium specimens. To insure the continuity of our living collections 193 taxa were propagated to provide additional specimens for the living collections.

Education

The members of the Arboretum staff who are members of the Faculty of Arts and Sciences are available to offer formal courses within the Harvard curriculum and to guide the programs of graduate students. In this capacity Dr. Wood offered

a course in elementary plant taxonomy and Dr. Howard an advanced class. Dr. Schubert is supervising the research graduate studies program of Mr. Mario Sousa-Sanchez. Drs. Howard, Nevling and Wood participated in a new cooperative course offered in the Department of Biology to acquaint new graduate students with the various research fields and experimental programs of the department. Dr. Howard's class made a field trip to Southern Florida during the Thanksgiving vacation week.

Several staff members made presentations as part of a weekly seminar in systematic botany held in Cambridge. In addition, Dr. Howard taught the systematics portion of a tropical botany institute sponsored by the University of Miami with the cooperation of the Fairchild Tropical Garden. He also presented lectures and conducted a field trip for the summer program in Marine Science offered by Cornell University at the Isles of Shoals off Portsmouth, New Hampshire.

Throughout the year, but especially during the summer months, the Arboretum has offered employment to high school and college students. Due to more stringent wage controls required by the U.S. Government, this program, which had been informal and educational, was jeopardized. Accordingly, a new emphasis was placed on the training aspects of the opportunity by a careful selection of candidates who were bona fide students of botany or horticulture. The students are apprentices to staff members and receive several hours of formal instruction in the course of the week. Students were accepted during the past year from Antioch College, Belmont Hill School, Harvard College, Norfolk County Agricultural High School and Smith College.

Andrew C. Robinson was the winner of the Arnold Arboretum Award for Botanical and Horticultural Excellence for 1971, given each year to a senior student in a high school near the Arnold Arboretum. Although Andrew lives in Arlington he has been a special student at Jamaica Plain High School. During the year Andrew visited the Arnold Arboretum frequently. He hopes to have his own greenhouse business in ornamental plants after he finishes his schooling at the University of Massachusetts.

The informal education program at the Arboretum is open to members of the Friends of the Arnold Arboretum at special rates and to the general public. Classes during the past year included practical gardening, ecology, pruning, techniques of bonsai, and the evaluation of horticultural materials.



Two displays open to the public were staged in the auditorium of the Administration Building. One consisted of photographs, specimens, and books connected with the work of Charles Sargent and his staff and was associated with the publication of Sargent's biography by Stephanie Sutton. The second exhibit was a display of posters from foreign countries concerned with conservation, wild flower protection and ecology. The exhibition material was a part of the Saving the Flora of Europe exhibit shown in Glasgow, Scotland, during the previous year. This display requested by the Arnold Arboretum will be sent to other American institutions for display during the fall and winter.

The Arnold Arboretum sponsored a conference on Rock Garden plants and a series of horticulture tours which visited places of special interest in New England. We particularly appreciate the kindness of individual Friends who permitted these groups to visit their private homes and gardens. Several other plant societies have held regional meetings at the Arnold Arboretum in Jamaica Plain or in Weston.

The staff receives many requests for speakers and as many as possible are accepted on individual option. Over 100 garden clubs, horticultural organizations and conferences had staff members as speakers during the year. When talks are given during normal working hours, a contribution to the educational work of the Arnold Arboretum is requested. Each speaker has the opportunity of stressing the Arboretum activities even though a talk on a specific topic is requested. We are pleased with the number of organizations that have scheduled visits to the Arboretum following the talk of a staff member. Lectures given to universities and colleges are usually without remuneration, but serve to communicate the professional work of the individual.

The activities of the staff with the community projects are casual or organized efforts at instruction. We have participated in training programs for science teachers of the Boston school system in ecology as well as special plant maintenance oriented instruction for teachers of specific schools.

Herbarium

The largest percentage of increase in the herbarium of the Arnold Arboretum occurred in that portion housed in Jamaica Plain consisting of plants under cultivation in various parts of the world. The herbarium of cultivated plants now contains 145,989 specimens and the total herbarium holdings is



Part of an exhibit of Sargentiana associated with the publication of S. B. Sutton's book Charles Sprague Sargent and the Arnold Arboretum.



*S. B. Sutton
Photos: P. Bruns*

935,839 sheets. Specimens were collected from plants growing on the grounds and from new additions to the living collections, to supplement existing records, making certain that as many taxa as possible are represented by flowers, fruits, and material displaying winter condition. Additional lots of specimens of cultivated plants have been received from Florida, Pennsylvania and Louisiana within the United States and from the West Indies, South Africa and New Caledonia. Many of these were obtained in exchange, but the amount of material sent to us for identification also increased. A survey of the plants cultivated in the Boston Public Garden and on the Boston Common has been completed. Specimens were collected and a list of determinations was supplied to the Friends of the Public Garden. The Boston Department of Parks and Recreation is now preparing new labels to be placed on these plants. An index, supported by herbarium vouchers, has been started of the plants commonly cultivated within the City of Boston. It is hoped that an evaluation of plant tolerance and performance under these environmental conditions will permit some comparative observations when new materials are tried in the community-cooperative programs.

Four separate floristic studies involve several members of the herbarium staff. The areas are southeastern United States, the State of Veracruz in Mexico, the Lesser Antilles, and Hong Kong and the New Territories. Staff members continued the field work associated with each of the projects and progress is apparent in each. The bibliography of the publications of the staff and the students offers a survey of individual research projects that have been completed and published during the year.

Library

The increasing costs of books and services associated with the libraries is becoming of great concern. The members of the Arboretum staff represent many areas of specialized interest and in the past we have attempted to have a representation of books pertinent to these interests for reference and for teaching purposes. Publications from foreign countries may once have been considered reasonable in price, but at the present time the price per page of many foreign publications exceeds that of American periodicals and books. Within certain areas of knowledge the association of the libraries of the Gray Herbarium and the Arnold Arboretum in Cambridge has permitted

a coordinated acquisition program. In areas of forestry, world floras, or horticultural publications for deposit and use in Jamaica Plain, the responsibility is that of the Arnold Arboretum staff alone. A careful study is in order to determine the coverage of library materials desirable. A few volumes are received annually from publishers as review copies and such reviews are published in *Arnoldia*. A few periodicals are received in exchange for the *Journal of the Arnold Arboretum* or for *Arnoldia*. The largest number of acquisitions, however, remains by direct purchase.

The total holdings of the library of the Arnold Arboretum in volumes and pamphlets was 79,741 on June 30, 1971. This is a net increase of 2,093 items during the fiscal year. Microfiche reproductions are purchased jointly with the Gray Herbarium and twenty-one herbaria or rare volume microfiche were obtained. The binding of periodicals is a recurring expenditure, but during the year we have increased our attempts to recondition or repair older volumes which show the signs of age or deterioration. A total of 1,100 volumes were bound in the past year and a special gift was gratefully accepted to further this program during the next year.

Shelf listings have been renewed in the library in Cambridge and were begun for Jamaica Plain. A reorganization of the American periodicals was completed in Jamaica Plain where the map collection was also catalogued for the first time.

A Xerox 720 copy machine was leased for general cooperative use in the Harvard University Herbaria. This has reduced the number of library volumes which were formerly sent out for copying or on interlibrary loan. The volume of copy service to our scientists and to other libraries has increased due to the added convenience, but this effort is largely self-supporting through fees.

Miss Stephanie Sutton is undertaking a biography of Joseph Rock who collected plants for the Arnold Arboretum in Asia. Many of Rock's letters, field notebooks and photographic negatives were the property of the Arnold Arboretum. Upon his death, however, materials of his estate were widely scattered. Miss Sutton visited the Royal Botanic Gardens, Edinburgh, Scotland, and several locations in Hawaii to study materials held there. She was able to purchase on our behalf the papers of Rock bequeathed to his nephew in Austria. These manuscripts and letters will be incorporated in the Arnold Arboretum library after they have been catalogued.

Case Estates

The Case Estates in the geographic center of the town of Weston is an important area in the function of the Arnold Arboretum. Many of the materials propagated in the greenhouses in Jamaica Plain are moved to Weston as young plants to permit their development before selections are made of specimens to be incorporated in the main collections. These nursery areas, therefore, are in a state of change almost every season. In contrast are the permanent plantings in Weston. These in part are display plantings designed to enhance the appearance of the grounds for the local residents. They serve as well in the teaching programs conducted in Weston. The entire area is used by Weston schools in their science programs.

The display beds of mulching materials were reworked when the wooden edging required replacement. A variety of materials, steel, aluminum, brick and plastic are now used as edging or dividers for the study of their comparative values.

Mr. Pride has personally developed an extensive rock garden in the area around the Red Schoolhouse, which serves, as its name implies, as a teaching area. Miss Marion Case, from whom the property derives its name, had such a garden for the students of the Hillcrest Garden training program, but only a rock-lined pool and some Italian tiles remained as evidence of the former garden. This area, avowedly experimental, draws considerable attention. A dry stone wall was built by the staff and special plantings were made in an adjacent area.

The town of Weston has a sewage problem and had proposed a treatment plant as one solution. As the Case Estates area requires irrigation of the trees and shrubs, and additional mulch-fertilizer material is always useful, we felt some cooperative arrangement would dispose of the effluent and sludge on our collections. Regrettably, the proposal was not approved by Commonwealth of Massachusetts authorities. It was necessary, therefore, to begin a program of extending irrigation lines through the property, particularly to nursery areas. We have also secured a supply of sewage sludge from Regis College for use experimentally on a quarter-acre nursery bed. Initially, a cover crop of buckwheat will be used in repetition to measure preliminary effects.

The course in practical gardening conducted by Mr. Hebb was asked to give its special attention to the perennial garden in Weston. With a devotion and efficiency that is greatly appreciated but must be seen to be believed, this group began the

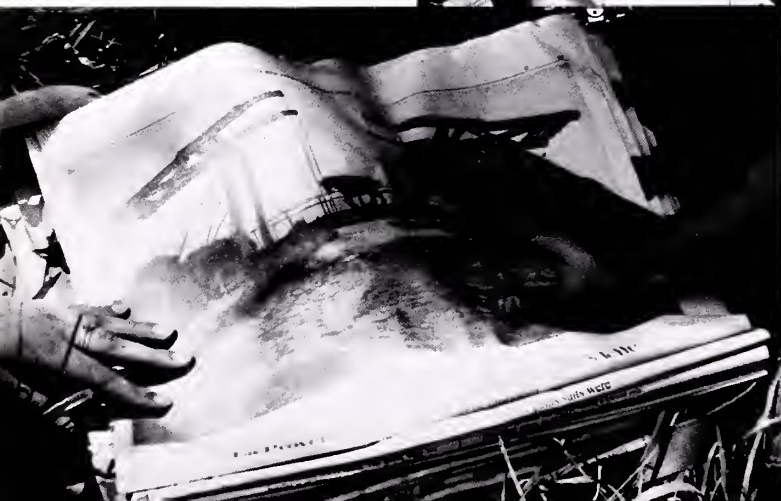
tremendous task. Old and overgrown plants were removed. Designs were drawn up and new plants obtained and planted. The rejuvenated beds have been attractive this spring and forecast the improvements possible in this area and the usefulness of volunteer help.

The Staff

We can report two promotions within the staff. Mr. Robert Williams as superintendent of buildings and grounds received an appointment without limit of time. Mr. Michael Canoso, formerly Senior Curatorial Assistant, has been given a new title and responsibilities as the Manager of the Systematic Collections.

Dr. Kenneth R. Robertson and Dr. Stephen A. Sponberg joined the staff as assistant curators to work with Dr. Carroll E. Wood on the Flora of the Southeastern United States project. Mr. Jack Link has been appointed assistant horticulturist to be in charge of the records and mapping of the living collections. Mrs. Sheila Geary was appointed assistant librarian in charge of the library in Jamaica Plain, replacing Miss Jean Caldwell.







An important facet, as well as a very pleasant one, of our work at the Arboretum is the collection of specimens from the different trees and shrubs on the grounds. Pieces are cut from the plants, pressed between pages of newspaper as shown in these pictures, and dried as soon as possible. An effort is made to collect at different times of the year so that we have representative material from all stages of growth — winter twigs, unfolding leaves, mature leaves, flowers, and fruits — of the various plants. After these specimens have been dried and mounted on stiff paper they become part of the permanent record of the plants we have grown here. Duplicate specimens are exchanged with other institutions, and as a result we have been able to build up a representative collection of plants cultivated around the world.

These pictures show some aspects of a typical day's collecting. The participants are Richard Weaver, one of our Assistant Curators, Ida Hay, our Herbarium Assistant, and Jeanne Leavitt, a student from Antioch College who spent two terms at the Arboretum on a work-study program.

Photos: P. Bruns

Staff Honors

We are exceedingly pleased to report the special honors and awards received by members of the staff.

Dr. Lily May Perry was awarded the degree of Doctor of Science, *honoris causa* by Acadia University, Wolfville, Nova Scotia, with the citation stating that Dr. Perry "has devoted her life to solving the mysteries of plant relationships, and has become an authority on the vascular plants of South East Asia."

Dr. Carroll E. Wood, Jr., was honored by Roanoke College, Salem, Virginia, with its medal to alumni in recognition of distinctive service and professional achievement.

Dr. Donald Wyman received the Arthur Hoyt Scott Garden and Horticultural award at the Commencement exercises of Swarthmore College. A citation noted him as "a man whose devotion to horticulture has been absolute."

The George R. Cooley award made annually for the best scientific paper presented during the meetings of the American Society of Plant Taxonomists was given to Dr. Lorin I. Nevling, Jr., and Dr. Thomas Elias for their joint paper on the genus *Calliandra*.

Professional Appointments

The services and participation of staff members in professional organizations are extracurricular, but are significant contributions to our profession. Many are term appointments, but some are of longer duration and have been mentioned in previous reports and so continue through this year. Some new appointments include the following:

Dr. Gordon DeWolf. Editorial and Publication Committee of the American Horticultural Society. Director and Vice President, Traphole Brook Protection Association, Inc. Member of the Council, New England Botanical Club.

Dr. Thomas Elias. Member of the Council, New England Botanical Club.

Dr. Richard A. Howard. Chairman, Cumulative Index Committee, American Horticultural Society. Scientific Advisory Committee, Pacific Tropic Botanical Garden. Advisor, Horticultural Committee of the Garden Club of America.

Mr. Robert Long. Chairman, Oberly Memorial Award Committee, Agricultural and Biological Subsection, Association College and Research Librarians. Chairman, Secretariat, Conference of Botanical and Horticultural Libraries. Public Relations Committee, New England Library Association.





Photographing a sequence in the Arboretum centennial film.

Hibiscus syriacus 'Meehani' shown in above film sequence.
Photos: P. Bruns



Mr. George Pride. Trustee of the Worcester County Horticultural Society. Director, American Rock Garden Society.

Mrs. Helen Roca-Garcia. Member of the Natural Science Committee, Nantucket Maria Mitchell Association.

Meetings

Meetings of national professional societies are usually held annually and those of international societies at longer intervals. It is of benefit to the staff personally and to the Arboretum when members can attend. Two international meetings were scheduled during the year which were of interest to the staff. Dr. Schubert was an invitational speaker at the first international symposium on *Dioscorea*, held in Mexico. The genus *Dioscorea* has been the subject of much of her research. Mr. Pride attended the International Rock Garden conference in England. He is a director of the American Rock Garden Society.

The Arboretum was represented by other staff members at the two meetings of the American Institute of Biological Sciences held in Indiana in September and in Canada in June, the American Horticultural Congress, the American Association of Botanic Gardens and Arboreta, the International Plant Propagators' Society, and the American Rhododendron Society. Drs. Howard and Wood presented papers in symposia at these meetings and Drs. Nevling, Elias and Mr. Fordham offered contributed papers in open sessions.

Mr. Long represented the Arnold Arboretum and its library at the Conference of botanical and horticultural libraries in New York and at meetings of librarians in Madison, Wisconsin, and Portsmouth, New Hampshire.

Travel and Exploration

The travel of the staff in the course of the year appears to be extensive and is profitable to the organization. There are opportunities for special expeditions to specific areas seeking certain groups of plants. Travel to scientific meetings or even vacation travel often permits some collecting of herbarium material, the acquisition and preservation of material for special studies, and always the opportunity to take photographs of aid in teaching and lecture programs.

Dr. Nevling spent part of each summer season covered by this report in Mexico gathering materials and data for the floristic project undertaken cooperatively with the National University of Mexico. Dr. Hu spent several months in Hong Kong where her work toward a flora received the cooperation

of the staff of Chung Chi College. Dr. Howard and Dr. Weaver made a special trip to the Lesser Antilles and the islands of St. Vincent and St. Lucia with the goals of climbing the Soufriere, Morne Garu and Morne Gimie. The cooperation of Messrs. McConnie and DeFrietas of the Department of Agriculture on St. Vincent made the trips successful. The help of members of the Bilharrzia project of the Rockefeller Foundation on St. Lucia is also acknowledged with gratitude. While attending a meeting of the Scientific Advisory Board of the Pacific Tropical Botanical Garden on Kauai in Hawaii, Dr. Howard was able to renew his observations on the bauxite rehabilitation project that concerned him several years ago. Mr. Fordham was able to visit and exchange materials with the Arboretum of the University of Manitoba and the Experiment Station at Morden while enroute to the meeting of the International Plant Propagators' Society. Associated with vacation travel, Dr. Wood obtained kodachrome pictures of vegetation in Mexico and Europe, as did Mr. Pride in Ecuador and the Gallapagos Islands and Mrs. Roca-Garcia in Spain.

Mercer Fellows

The Mercer Fellowship program is designed to permit individuals to work with our collections of living plants, herbarium specimens or books. Many applicants wish to have the opportunity of working with an individual staff member to learn a technique or to have informal guidance in developing a skill or a research project. Although no formal call for applicants has ever been distributed, the awards and opportunities are becoming well known and this year applications far exceeded the funds and the number of people we could house suitably.

Mercer Fellows for all or part of the year and their origin and project area included the following:

Harmony Clement (Massachusetts) — Development of horticultural meetings

Nancy Page (California) — City beautification programs

Christian Puff (Austria) — Nodal and petiolar anatomy

Mario Sousa-Sanchez (Mexico) — Monographic studies of *Lonchocarpus*

Leslie Joan Spraker (Indiana) — Horticultural writing

Donald Vining (Georgia) — Horticultural writing and plant propagation

Ivey Woodworth (Massachusetts) — City beautification and recreation programs



Rhododendron sp. Photo: P. Bruns

Friends of the Arnold Arboretum

The Friends of the Arnold Arboretum is an informal group of people who by annual contributions or occasional large gifts support the activities of research, display and education, which are the functions of the Arnold Arboretum. Membership is open to all who wish to join and the group increased to over 1500 during the year.

The endowment of the Arnold Arboretum has been accumulated from gifts and bequests of former Friends. The gifts of the present membership are essential, not only to meet rising costs, but to undertake special projects. Special gifts from the Friends have, at their request, been used to support work on the grounds, including the care of the *Rhododendron* collections, the bonsai and dwarf conifers, the development and mainte-



A group of volunteer workers planting spring-flowering bulbs at the Arboretum. Photo: P. Bruns

nance of a narcissus collection, travel for staff members for plant exploration and introduction, the binding of books in the library, aid in the development of community projects and aid in special publications. Gifts for such restricted use are accepted if they are within the interests and abilities of the staff. The unrestricted gifts from the Friends are of great value as they allow the funds to be used where most needed for equipment, supplies, or labor. Gifts are tax-deductible within the usual Federal regulations, however, few people realize this is almost uniquely an American privilege and practice.

Friends receive the issues of *Arnoldia* published bimonthly. The Arnold Arboretum collections are theirs to visit and enjoy. The members of the staff are ready to aid as they can in special problems or requests of the Friends. Members of the Friends receive special publications according to their generosity, but all have the opportunity of special prices for lectures, classes or tours.

The Friends organization promises to be more active and involved during the coming Centennial Year program. Rear Admiral Harry Hull, U.S.N. (Ret.), of Manchester, Massachusetts, has accepted the position of executive chairman of the Centennial program. Committees are being formed to assist and participate in the programs planned.

Gifts and Grants

The Arnold Arboretum was the beneficiary of bequests from the estates of Mrs. Homer Sweet and Dr. Helen M. Scorgie. Mrs. Sweet was a former member of the Committee to Visit the Arnold Arboretum. Her bequest was increased with a special gift from the New England Section of the Women's Farm and Garden Association. The income of this gift will be used in association with the activities of the Arnold Arboretum in Weston and on the Case Estates.

Dr. Helen Scorgie, formerly of Harvard, Mass., was an active member of the New England section of the American Daffodil Society. She was responsible for the development of the exhibit of classified varieties of narcissus maintained on the Case Estates. Her gift was specified to be used to maintain and enhance this display area.

Gifts of plants, books and materials of value to the collections of the Arnold Arboretum have been received from many individuals. We are particularly grateful to Mr. and Mrs. Donald Smith, Mr. Joel Spingarn and Mr. Layne Ziegenfuss for material of dwarf conifers which have added materially to our collection

of named and selected clones. A special generous gift was received from Dr. George R. Cooley to assist in a program of rebinding library volumes.

The work of Dr. Carroll Wood and his staff toward a generic flora of the Southeastern United States has been supported by a grant from the National Science Foundation. A renewal of the current grant for the fourth year has been received. Miss Stephanie Sutton received awards from the American Philosophical Society and the Ella Lyman Cabot trust for her work toward a biography of Joseph Rock.

Publications

Dr. Bernice Schubert continued to serve as editor of the *Journal of the Arnold Arboretum*. The four issues comprising volume 52 involved 667 pages with 31 articles by 38 authors. Ellen Bernstein, editorial assistant, is preparing a 50-year index to authors and titles. This will be available to subscribers as a special publication during the year.

A review of the increased costs of publishing and distributing the numbers of the *Journal of the Arnold Arboretum* indicated that our subsidy of this publication was excessive. The *Journal* is used in exchange for other publications, but a comparison of the subscription prices would suggest incorrectly that the exchange was markedly in our favor. To place a more accurate value on the *Journal* and help to meet the ever increasing costs of publication, the price per volume was increased to \$16.00 for the next year.

In October of 1970 Mrs. Helen Roca-Garcia accepted the editorial responsibilities for *Arnoldia*. Miss Pamela Bruns continued with the responsibility for the illustrations and the layout. An editorial board of Dr. DeWolf, Dr. Howard and Mr. Pride was appointed to assist in manuscript selection. Volume 30 of *Arnoldia* contained 260 pages of text and ten pages of index.

One special publication was issued by the staff during the year. A colorful booklet "The Arnold Arboretum: The First Century" was written and compiled by Stephanie Sutton with illustrations by Pamela Bruns. It was designed by Christopher Reed and printed by the Nimrod Press. The booklet of 72 pages includes eight pages of color illustration, a foreword by Walter Muir Whitehill, and an afterword by Dr. Howard.

The Board of Overseers Committee to Visit the Arnold Arboretum

To aid the University in its supervision of the administration



Planting spring-flowering bulbs. Photo: P. Bruns

of the Arnold Arboretum, the alumni-elected Board of Overseers appoints one of its members as chairman of a committee to examine the activities of the staff and the condition of the collections. The committee is selected by the chairman and members represent special qualifications in areas of horticulture or botany, publications, community affairs or education. One member is usually a resident of the town of Weston, the location of the Case Estates, and the chairman of the Boston Department of Parks and Recreation is an official member. The committee

meets once or more each year and observes the Arnold Arboretum in its three locations and many activities. Ultimately a report from the chairman is given to the President and Fellows of Harvard as the trustees of the Arnold Arboretum. The committee, individually and collectively, is of great help to the staff. Their service on the committee and to the Arnold Arboretum is appreciated.

The Visiting Committee during the academic year 1970-71 included:

George Putnam, Chairman, Boston, Mass.
 George R. Clark, Vice-Chairman, Philadelphia, Pa.
 Mrs. George L. Batchelder, Beverly, Mass.
 Mrs. Ralph Bradley, Canton, Mass.
 Mr. Frederick D. Brown, Webster, Mass.
 Mrs. Paul Cabot, Needham, Mass.
 Mrs. Bruce Crane, Dalton, Mass.
 Dr. John Creech, New Carrollton, Md.
 Mr. Joseph Curtis, Commissioner, Boston Parks and Recreation Dept.
 Mrs. F. Stanton Deland, Jr., Chestnut Hill, Mass.
 Mrs. Dudley B. Dumaine, Weston, Mass.
 Mr. William Flemer, III, Princeton, New Jersey
 Mrs. Irving Fraim, Waltham, Mass.
 Mrs. Julian W. Hill, Wilmington, Delaware
 Mr. Henry Hosmer, Boston, Mass.
 Mr. Seth Kelsey, Stamford, Conn.
 Dr. Russell E. Larson, University Park, Penn.
 Mr. Milford R. Lawrence, Falmouth, Mass. Deceased
 Mrs. John Lockwood, Bedford, New York
 Mr. R. Henry Norweb, Jr., Mentor, Ohio
 Mrs. Richard W. Pratt, Chestnut Hill, Mass.
 Mrs. Donald Ross, Montchanin, Delaware
 Mrs. W. Davis Taylor, Westwood, Mass.
 Mrs. Julian Underwood, South Dartmouth, Mass.
 Mrs. G. Kennard Wakefield, Milton, Mass.
 Mr. Nathaniel Whittier, Medfield, Mass.
 Mr. Roger C. Wilkins, Avon, Conn.
 Mrs. John G. Williams, Gladwyne, Penn.

RICHARD A. HOWARD, DIRECTOR



Visitors attending Conservation exhibition. Photo: P. Bruns

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Top and left: Grounds crew working at the Arboretum. Photos: P. Bruns



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Dana Greenhouses and Nursery area. Photo: Alfred Fordham

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1970-1971

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Birds in the Arnold Arboretum

In the first published account of the birdlife of the Arnold Arboretum, in 1895, C. E. Faxon made the following observation: "Although the suburbs of Boston are peculiarly well fitted for the abode of a great variety of birds, the continual encroachment of urban conditions will eventually make such a place as the Arnold Arboretum a precious spot for the city bird-lover who is obliged to look near at hand for the enjoyment of his favorites."

Mr. Faxon's prediction has been largely correct. In spite of its increasingly urbanized surroundings and large number of visitors, the Arnold Arboretum has remained a viable bird sanctuary from the time of its founding. However, truly natural habitats are rare in the Arboretum now, and as a consequence the resident birds are those which prefer an open or disturbed habitat, or those which can tolerate or even prosper under the presence of man. Still, the Arboretum provides a wide range of semi-natural habitats, as well as a varied and abundant food supply, a combination which attracts large numbers of migrants. Although the fauna is hardly an exceptional one, birds of various species are relatively numerous throughout the year, and some of the summer residents are among our most attractive and desirable songsters.

During the wintertime, the regularly maintained feeder at the side of the Administration Building is visited by several species of birds, much to the delight of those of us who work here. Blue Jays, Black-capped Chickadees, Slate-colored Juncos, and White-crowned Sparrows may be seen in fair numbers nearly every day, and Downy Woodpeckers, Cardinals and Ring-necked Pheasants are not uncommon. The ubiquitous "city birds" (Pigeons, Starlings, and English Sparrows) are conspicuous throughout the Arboretum, as are Crows and Blue Jays. Increasing numbers of Robins and Mockingbirds spend the winter here, especially in the more sheltered areas, and Mallards and Black Ducks are frequently seen on the ponds and brooks. If one is willing to wade through the frequently heavy

snowdrifts, Hemlock Hill is one of the best places in the Arboretum in which to observe winter birdlife. Although it has been culled from time to time, and plantings have been made in a few areas, the forest here approaches a primeval condition. Hemlock Hill is an isolated, sheltered haven for birds which prefer coniferous forests, and on most days it is alive with constantly moving flocks of Chickadees and their attendant Nuthatches, both the White-breasted and Red-breasted species.

The colorful Cedar Waxwings are among the more delightful winter visitors in the Arboretum. They pass through irregularly during the year, but at this season when the resident bird population is a relatively dull one, their arrival is a welcome event for the bird-watcher and casual visitor alike. Waxwings are particularly attracted to the fruits of the crab apples, hollies, and junipers, and a flock alighting on a fruit-laden tree, accompanied by a constant high-pitched, wheezy twittering, is unlikely to pass unnoticed.

Because of the influx of a large number of migrants, mostly of species that do not take up residence, springtime is the most exciting time for observing birdlife in the Arboretum. Although a few species, notably the Fox Sparrow, arrive in February, new birds are not conspicuous until mid-March. By then, the male Red-Wings are noisily choosing nesting sites in the meadow in anticipation of the arrival of their mates a few weeks later. At about the same time, the first metallic twangs of the Purple Grackles, larger and somewhat less desirable relatives of the Red-Wings, may be heard.

During April, the bird population does not change appreciably, although winter visitants such as the Slate-colored Juncos head north and Phoebes and Brown Thrashers arrive. By early May, however, the migrants start coming through in large numbers. Warblers of several species are conspicuous because of their bright colors and songs remarkably loud for such small birds. During May of 1971, Palm Warblers were common in the shrubby areas, and Hemlock Hill was virtually alive with flocks of Blackburnians, Black-throated Greens, Black and Whites, Cape Mays, and Parulas. Myrtle Warblers were common throughout, but they seemed to prefer the Conifer Collection.

At about the same time, the resident birds settle in for the summer. The Mimic Thrushes (not to be confused with the true Thrushes) are well represented among the Arboretum's summer bird fauna, all three eastern North American species being present. All are large and conspicuous with the ability to mimic the calls of other bird species. The best mimic, the

Mockingbird, is the least common of the three. It is primarily a bird of southeastern United States where it is in many places one of the most common of the avian species. In the spring of 1971 a nest was found in the Arboretum for the first time. A pair of Mockingbirds raised at least two young in a small American Holly tree near the Bonsai House, and several surprised visitors to the Bonsai House were dive-bombed by the irate birds.

The repertoire of these large gray, black, and white birds is incredible. One evening in southern Pennsylvania I heard a Mockingbird mimic with remarkable accuracy the songs of 23 different species of birds at one sitting. The phrases of the song are repeated numerous times, and a single concert may proceed without prolonged interruption for nearly an hour. Unfortunately these birds sometimes choose to sing at times when they are not exactly appreciated. Trying to sleep with a Mockingbird sounding off right outside one's bedroom window at 3:00 A.M. can be a most frustrating experience.

The Brown Thrasher is much more common than the Mockingbird, but as a mimic it is far inferior. The song has as pleasing a quality as that of its more talented relative, but is of shorter duration and the phrases are repeated only once or twice. Looking like a large and ungainly, long-beaked, long-tailed, yellow-eyed Wood Thrush, with which it is frequently confused, the Brown Thrasher is one of the Arboretum's most conspicuous summer birds. The Catbird, the third of the Mimic Thrushes, is about as common as the Brown Thrasher, but because of its smaller size, drab coloration, and secretive habits, it is less conspicuous. Its mewing call, usually made from a low, concealed perch, is the source of its common name. In contrast to its relatives, the mimicking abilities of the catbird are poorly developed, and the mimicked phrases are seldom repeated.

Of the several warblers that are summer residents in the Arboretum, only the Yellow Warbler is common and conspicuous. The male is our only predominantly yellow bird. As these warblers prefer open shrubby areas, the Arboretum is a perfect place for them. During the spring of 1971, several pairs took up residence in the shrub collection and the lilacs, and the loud, clear "sweet-sweet-mary-mary-sweet" of the males was to be heard throughout the day in these areas.

Four members of the Blackbird Family are common summer residents in the Arnold Arboretum — the Red-Wing and the Purple Grackle, mentioned earlier, the Cowbird, and the Balti-



Yellow Warblers are the most common of the three species of Warblers which presently nest in the Arnold Arboretum.

Photo: Henry G. Daniels. Courtesy Massachusetts Audubon Society

more Oriole. The male of the last is one of our most brightly colored birds and is easily seen, even though the species shows a distinct preference for the taller shade trees. The rattling chatter, made in flight, and the clear, flute-like whistles of the Orioles are familiar sounds here in the early summer. Although not as elaborate as those of some of its tropical relatives, the hanging basket-like nest of the Baltimore Oriole is still one of the most remarkable to be built by any of our native birds.

Equally remarkable, but in a much different way, are the nesting habits of the Cowbird. This rather unattractive bird is a parasite, much like the completely unrelated Old World Cuckoos. Rather than raising its own young as a respectable bird would do, the Cowbird lays its eggs in the nests of other species, and then forgets about them. Particularly if they are of a smaller species, the offspring of the "foster parents" suffer at the expense of the young Cowbirds, frequently unable to compete for food and ultimately being forced out of the nest.

Three species of Flycatchers have nested in the Arboretum during the past several years. The Robin-sized Crested Flycatcher is rare and not easily seen. The call and the habits of the Eastern Phoebe are more distinctive than its plumage. These drab-colored birds give the general impression of being nervous and high-strung, constantly wagging their tails while at rest and making frequent short, darting flights in pursuit of insects. The somewhat plaintive call sounds very much like the bird's common name. The Eastern Kingbird is the most conspicuous of the Arboretum's Flycatchers. Although its plumage is not brightly colored, the bird's white belly and terminal tail band are strikingly contrasted with the dark upper parts. Like the Phoebe, and most other Flycatchers for that matter, the Kingbird makes short, darting flights from an exposed perch in pursuit of insects. However, its normal manner of flight, with stiff, jerky wingbeats, is distinctive, as is its habit of hovering awkwardly in grassy areas, presumably to gain a vantage point for its insect-catching forays in the absence of a suitable perch.

The Scarlet Tanager is the only representative of a large, primarily tropical family to be found among the New England bird fauna. Tanagers as a group are colorful birds, and our native species is no exception. Although they are among the most common birds in Eastern deciduous forests, Scarlet Tanagers are somewhat secretive and not often seen.

The Yellow-shafted Flicker is the largest of the several Woodpeckers in the Arnold Arboretum, and the one most frequently seen in the summertime. It is also the only native Woodpecker

which commonly descends to the ground, where it hops about somewhat clumsily in search of ants. In flight the Flicker is unmistakable. The white rump patch is very conspicuous, and it is our only large bird with a "roller-coaster" flight.

Sparrows and finches are well represented among the summer birds in the Arboretum, and two are of particular note. The Indigo Bunting, a bird of fence rows and other sparsely wooded areas, finds numerous ideal habitats here. Although the male is a brilliant blue color when seen by reflected sunlight, in silhouette or among foliage he appears merely as a nondescript dark bird, and therefore not particularly conspicuous. The loud and varied song of these small birds, however, is one of the most frequently heard on summer days in the Arboretum.

The Rufous-sided Towhee or Chewink, a larger, long-tailed member of the Finch Family, is also common in the Arboretum. These black, white, and rusty-red birds prefer dense brush and are most often seen (or heard) scratching around among fallen leaves. The call, the familiar, slurred "chewink" and the song, "drink-your-tea" or "tow-hee" are the sources of both of the bird's common names.

As the summer wears on, the birds become less and less conspicuous. With the moult of their breeding plumage, they become more secretive and the songs practically cease. The Grackles and the Red-Wings have already gone south by the end of summer, and the waves of mostly dull-colored migrants signal the beginning of autumn.

Changing Bird Populations in the Arnold Arboretum

Observations on the birdlife of the Arnold Arboretum have been recorded since the early days of the institution's existence. The first published account, by Mr. C. E. Faxon in 1895 (*Garden and Forest* 8: 292, 293. 1895), listed 50 species of birds as breeding residents on the grounds at Jamaica Plain. Records since then have shown marked changes in the composition of the resident bird fauna. From 1939 to the present, the Children's Museum (Jamaica Plain) Bird Club, under the leadership of Miss Miriam Dickey, presently of the Massachusetts Audubon Society, have made regular bi-monthly walks in the Arboretum. For the period 1968-1970, this group recorded a total of 36 species seen on a nest or with young, and 6 additional species whose behavior and numbers indicated that they also nested here. My own observations in 1971 have added

two species to the list of breeding residents. Thus the number of species nesting in the Arnold Arboretum has decreased during the last 75 years, and the change has not only been a quantitative one. As certain species ceased to nest in the Arboretum, others moved in to take their place, but the influx of new species has not kept pace with the departure of the others. A comparison of the breeding residents in 1895 with those in the period 1968-1971 is made in Table 1.

During the last decade, the decline of several bird species has received considerable attention throughout the United States. The reasons for this decline are for the most part numerous and complex, but among them the toxic effects of pesticides have received the most study and publicity. The most effective pesticides, and those that have been most extensively used for a long period of time are a class known as chlorinated hydrocarbons — DDT, Dieldrin, Chlordane, etc. These compounds decompose slowly, and when they are concentrated in the body tissue (mostly fatty tissue) of birds calcium metabolism is impaired. Since the chlorinated hydrocarbons are not soluble in water, they cannot be concentrated in plant tissues. Seed-eating birds, therefore, are not affected, but insectivorous and carnivorous species have suffered greatly.

Of the birds that have ceased to nest in the Arnold Arboretum during the last 75 years, most are of the insectivorous species. The Warblers in particular have declined. In 1895 nine species nested here while only three do so at present. Flycatchers and Thrushes have also been disappearing. These groups are on the decline in many areas, particularly urbanized ones. Pesticides have certainly been responsible to some degree. However, insectivorous birds rarely show the type of reproductive failure attributed to pesticides that has been so well documented in the decline of Hawks and their relatives. Therefore other factors are involved. Urban conditions and civilization in general pose insurmountable problems to many bird species. Nesting sites are destroyed and the habitat generally becomes unfavorable. Predators — cats, dogs, squirrels, and man — become more numerous, and introduced bird species compete for food and territory.

The decline of certain of the birds which formerly nested in the Arboretum has been well documented and is well understood. Barn Swallows, Bobolinks, and Vesper Sparrows have decreased with the agriculture on which they are dependent. Bluebirds suffered heavy mortality during unusually severe



Southern winters in the 1940's and 1950's. Suitable nesting sites, especially with the heavy competition by English Sparrows and Starlings, have become increasingly rare, further hastening their decline. Bobwhites have suffered from over-shooting and severe winters. It is thought that native Bobwhites are now extinct in Massachusetts, and that the birds which are occasionally seen have been stocked.

Although land use in the Arnold Arboretum has changed markedly since 1895, practices here do not appear to have significantly affected the composition of the resident bird fauna. There are still relatively undisturbed habitats available, and spraying with chlorinated hydrocarbons has been discontinued. The reasons for the change must largely be looked for in the Arboretum's increasingly urbanized surroundings, as well as in changing natural and man-influenced conditions throughout the Eastern United States.

The appearance of new species of nesting birds in the Arboretum since 1895 has been a mixed blessing. The several species of alien birds — Ring-necked Pheasants, Pigeons, Starlings, and English Sparrows — are a conspicuous element among the newcomers. The last three are omnivorous, aggressive, and remarkably prolific and thus able to outcompete many native species for food and nesting sites. The phenomenal increase in the distribution and numbers of these aliens since their introduction has been in part responsible for the decline of several of our most attractive native birds. A recent book, entitled "The Alien Animals," by George Laycock (The Natural History Press), documents the introduction of these and other imported species and their effect on the native fauna. Much of the following information has been taken from this fascinating book.

Although efforts had been made as early as 1730, the Ring-necked Pheasant, a native of China, was successfully introduced into the United States in 1882. Judge Owen N. Denny, then the American consul in Shanghai, shipped a number of these birds to Oregon in that year, and most of the Pheasants in this country are derived from that stock. Though Pheasants regularly breed in the Northeast, the young birds suffer in particularly damp springs, and many nests are destroyed during the hay-cutting season. Therefore regular stocking is required to keep up that population.

The English "Sparrow," a native of the Old World, is related to the Weaver Birds of tropical Africa and Asia rather than to the true Sparrows. This noisy, gregarious bird has been carried by man to most of the temperate areas of the world. Eng-

pair of Mockingbirds nested in the Arboretum for the first time on record during the summer of 1971. This nest was their second of the season.

Photos: Top: Richard Weaver

Middle and bottom: P. Bruns

lish Sparrows were introduced into a number of cities in the United States and Canada during the 1850's and 1860's, primarily by bird lovers who thought that they would be a welcome addition to the fauna. By 1890 they had multiplied enormously, becoming serious pests in many areas, and efforts were already underway to eliminate them. The Sparrows' aggressive tendencies were apparent from the beginning. In his monumental series on the life histories of North American birds, the noted ornithologist Arthur Cleveland Bent wrote the following:

Many years ago, when I was a small boy, probably in the late 1860's or early 1870's my uncle, who lived next door to us in Taunton, Massachusetts, was the first to introduce English Sparrows into that immediate vicinity. He built a large flying cage in his garden that was roofed over, covered with netting on four sides, and well supplied with perches and nesting boxes. Here the sparrows were so well fed and cared for that they soon began to breed. It was not long before the cage became overcrowded, and he ordered the coachman to put up numerous nesting boxes all over the place and to liberate the sparrows. They soon filled all the new boxes, and also drove away the purple martins, tree swallows, and house wrens from all the old boxes.

The Starling has not been as widely introduced throughout the world as the English Sparrow, but in the United States it has been equally successful. Starlings had been released in this country numerous times during the nineteenth century, but the first successful introduction is thought to have taken place in 1890. In that year, Mr. Eugene Schefflin, a drug manufacturer, released a number of these birds near Central Park in New York City. They nested the same year they were released, and the first known native-born Starlings in the United States were raised under the eaves of the American Museum of Natural History. By 1925 Starlings were the most common birds in New York City, and they had extended their range throughout the nation east of the Mississippi River.

Mr. Schefflin's interest in Starlings can be traced to his hobbies — the study of birds and the study of Shakespeare. In what must be a unique instance in the history of American ornithology, he decided to combine his hobbies by introducing into the United States every bird mentioned by Shakespeare.



Brown Thrashers are among the most common and conspicuous summer birds in the Arboretum.

Photo: Allan D. Cruickshank. Courtesy Massachusetts Audubon Society

The Starling qualified since it was mentioned once in *Henry IV*.

The ancestry of the pigeon goes back to the Rock Dove of temperate Europe and Asia. These birds have been domesticated for nearly 5000 years and during that time a large number of unusual forms have appeared. Feral pigeons soon revert to their historic form and coloration, but they seldom desert the haunts of man. Although they have long been a nuisance in cities around the world, pigeons were and still are valued by man for their homing instincts and show qualities. They probably arrived in the United States with the first settlers, and are undoubtedly here to stay.

These alien birds have been so common and conspicuous throughout most of our lifetimes that it is hard to imagine what it was like without them. Other species among the newcomers are native to the United States but only recently have extended their ranges northward into New England. The Cardinal was almost unknown in Massachusetts 20 years ago, but it is now a fairly common permanent resident. The Mockingbird falls into the same category, the first nest in the Arboretum having been recorded this past spring.

With the decline of several of the insectivorous bird species, omnivorous species, which are as a group relatively immune to pesticides, have appeared to take their place. Pigeons, English Sparrows, and Starlings are the most conspicuous examples of these, but Purple Grackles and Mourning Doves, both native species, are also now nesting in the Arboretum.

Hawks, Owls, and other carnivores have suffered from the effects of pesticides more than any other groups of birds. Hawks in particular are on the decline throughout the United States. Thus it is surprising that Miss Dickey found Red-tailed Hawks and Sparrow Hawks, as well as Great Horned Owls, to be probable nesters in the Arboretum. An abundant food supply, in the form of English Sparrows, Chipmunks, and Gray Squirrels, is likely the attraction. If birds so sensitive to the effects of civilization as these do actually nest here, the decline in our resident birds may be nearing an end.

RICHARD E. WEAVER

TABLE 1
Breeding residents in the Arnold Arboretum

	1895 Based on the observations of C. E. Faxon	1968-1971 Based on various sources
Mallard Duck		X
Black Duck		X
Red-tailed Hawk		X*
Sparrow Hawk		X*
Bobwhite	X	
Ruffed Grouse	X	
Ring-necked Pheasant		X
Spotted Sandpiper	X	
Common Pigeon		X
Mourning Dove		X
Yellow-billed Cuckoo	X	
Black-billed Cuckoo	X	
Great Horned Owl		X*
Chimney Swift	X	X
Ruby-throated Hummingbird	X	
Yellow-shafted Flicker	X	X
Downy Woodpecker	X	X
Eastern Kingbird	X	X
Crested Flycatcher		X*
Eastern Phoebe	X	X
Least Flycatcher	X	
Wood Pewee	X	
Barn Swallow	X	
Blue Jay	X	X
Common Crow	X	X
Black-capped Chickadee	X	X
White-breasted Nuthatch		X
House Wren		X*
Catbird	X	X
Mockingbird		X
Brown Thrasher	X	X
Robin	X	X
Wood Thrush	X	X
Veery	X	
Eastern Bluebird	X	
Cedar Waxwing	X	
Starling		X
Yellow-throated Vireo	X	
Red-eyed Vireo	X	X
Warbling Vireo	X	X
Black and White Warbler	X	
Golden-winged Warbler	X	
Yellow Warbler	X	X
Black-throated Green Warbler	X	

* Not actually seen on nest or with young, but behavior indicating a nest in the vicinity.

Chestnut-sided Warbler	X	
Prairie Warbler	X	
Ovenbird	X	X
Maryland Yellow-throat	X	X
American Redstart	X	
English Sparrow		X
Bobolink	X	
Red-Wing	X	X
Baltimore Oriole	X	X
Purple Grackle		X
Eastern Cowbird	X	X
Scarlet Tanager	X	X
Cardinal		X
Rose-breasted Grosbeak	X	X*
Indigo Bunting	X	X
Purple Finch	X	X
Common Goldfinch	X	X
Towhee	X	X
Vesper Sparrow	X	
Chipping Sparrow	X	X
Field Sparrow	X	
Song Sparrow	X	X



TABLE 2

Birds, both resident and transient, seen in the
Arnold Arboretum by the Children's Museum Bird Club
during the period 1939-1968

*Double-crested Cormorant	* <i>Phalacrocorax auritus</i> (Lesson)
Great Blue Heron	<i>Ardea herodias</i> (Linnaeus)
Little Green Heron	<i>Butorides virescens</i> (Linnaeus)
Black-crowned Night Heron	<i>Nycticorax nycticorax</i> (Gmelin)
*American Bittern	* <i>Botaurus lentiginosus</i> (Montagu)
*Canada Goose	* <i>Branta canadensis</i> (Linnaeus)
Mallard	<i>Anas platyrhynchos</i> (Linnaeus)
Black Duck	<i>Anas rupripes</i> Brewster
Wood Duck	<i>Aix sponsa</i> (Linnaeus)
*Common Merganser	* <i>Mergus merganser</i> Cassin
*Goshawk	* <i>Accipiter gentilis</i> (Wilson)
Sharp-shinned Hawk	<i>Accipiter striatus</i> (Wilson)
Cooper's Hawk	<i>Accipiter cooperi</i> (Bonaparte)
Red-tailed Hawk	<i>Buteo jamaicensis</i> (Gmelin)
Red-shouldered Hawk	<i>Buteo lineatus</i> (Gmelin)
*Broad-winged Hawk	* <i>Buteo platypterus</i> (Vieillot)
*Rough-legged Hawk	* <i>Buteo lagopus</i> (Gmelin)
*Osprey	* <i>Pandion haliaëtus</i> (Gmelin)
*Duck Hawk	* <i>Falco peregrinus</i> Bonaparte
*Pigeon Hawk	* <i>Falco columbarius</i> (Linnaeus)
Sparrow Hawk	<i>Falco sparverius</i> (Linnaeus)
*Ruffed Grouse	* <i>Bonasa umbellus</i> (Linnaeus)
*Bob-white	* <i>Colinus virginianus</i> (Linnaeus)
Ring-necked Pheasant	<i>Phasianus colchicus</i> (Gmelin)
*Semipalmated Plover	* <i>Charadrius hiaticula</i> Bonaparte
*Killdeer	* <i>Charadrius vociferus</i> Linnaeus
*American Woodcock	* <i>Philohela minor</i> (Gmelin)
Spotted Sandpiper	<i>Actitis macularia</i> (Linnaeus)
Solitary Sandpiper	<i>Tringa solitaria</i> Wilson
*Lesser Yellow-legs	* <i>Totanus flavipes</i> (Gmelin)
*Semipalmated Sandpiper	* <i>Ereunetes pusillus</i> (Linnaeus)
Great Black-backed Gull	<i>Larus marinus</i> Linnaeus
Herring Gull	<i>Larus argentatus</i> Coues
Ring-billed Gull	<i>Larus delawarensis</i> Ord
Rock Dove	<i>Columba livia livia</i> (Gmelin)
Mourning Dove	<i>Zenaidura macroura</i> (Linnaeus)
*Yellow-billed Cuckoo	* <i>Coccyzus americanus</i> (Linnaeus)
*Black-billed Cuckoo	* <i>Coccyzus erythrophthalmus</i> (Wilson)
*Barn Owl	* <i>Tyto alba</i> (Bonaparte)
Screech Owl	<i>Otus asio</i> (Gmelin)
*Great Horned Owl	* <i>Bubo virginianus</i> (Gmelin)
*Snowy Owl	* <i>Nyctea scandiaca</i> (Linnaeus)
*Barred Owl	* <i>Stix varia varia</i> Barton
*Whip-poor-will	* <i>Caprimulgus vociferus</i> Wilson
Nighthawk	<i>Chordeiles minor</i> (Forster)
Chimney Swift	<i>Chaetura pelagica</i> (Linnaeus)
Ruby-throated Hummingbird	<i>Archilochus colubris</i> (Linnaeus)

* Infrequent or no longer seen

In the wintertime, Black-capped Chickadees are frequent visitors to the
bird feeder beside the Administration Building. Photo: Frank H. Wood.
Courtesy Massachusetts Audubon Society

- Belted Kingfisher
 Yellow-shafted Flicker
 *Pileated Woodpecker
 Yellow-bellied Sapsucker
 Hairy Woodpecker
 Downy Woodpecker
 *Arctic Three-toed Woodpecker
 Eastern Kingbird
 Northern Crested Flycatcher
 Eastern Phoebe
 Wood Pewee
 Tree Swallow
 *Bank Swallow
 Rough-winged Swallow
 Barn Swallow
 Blue Jay
 Common Crow
 *Fish Crow
 Black-capped Chickadee
 White-breasted Nuthatch
 Red-breasted Nuthatch
 Brown Creeper
 House Wren
 Mockingbird
 Catbird
 Brown Thrasher
 Robin
 Wood Thrush
 Hermit Thrush
 Swainson's Thrush
 Grey-cheeked Thrush
 Eastern Bluebird
 Golden-crowned Kinglet
 Ruby-crowned Kinglet
 Cedar Waxwing
 *Northern Shrike
 Starling
 *White-eyed Vireo
 Solitary Vireo
 Red-eyed Vireo
 *Philadelphia Vireo
 Warbling Vireo
 Black and White Warbler
 *Golden-winged Warbler
 *Brewster's Warbler
 Nashville Warbler
 Orange-crowned Warbler
 Parula Warbler
 Yellow Warbler
 Magnolia Warbler
 Cape May Warbler
 Black-throated Blue Warbler
 Myrtle Warbler
 Black-throated Green Warbler
 Blackburnian Warbler
Megaceryle alcyon (Linnaeus)
Colaptes auratus Bangs
 **Hylatomus pileatus* (Bangs)
Sphyrapicus varius (Linnaeus)
Dendrocopos villosus (Linnaeus)
Dendrocopos pubescens
 (Swainson)
 **Picoides arcticus* (Swainson)
Tyrannus tyrannus (Linnaeus)
Myiarchus crinitus (Bangs)
Sayornis phoebe (Latham)
Contopus virens (Linnaeus)
Iridoprocne bicolor (Vieillot)
 **Riparia riparia* (Linnaeus)
Stelgidopteryx ruficollis
 (Audubon)
Hirundo rustica Boddaert
Cyanocitta cristata (Linnaeus)
Corvus brachyrhynchos Brehm
 **Corvus ossifragus* Wilson
Parus atricapillus (Linnaeus)
Sitta carolinensis (Latham)
Sitta canadensis Linnaeus
Certhia familiaris Bonaparte
Troglodytes aëdon
Mimus polyglottos (Linnaeus)
Dumetella carolinensis (Linnaeus)
Toxostoma rufum (Linnaeus)
Turdus migratorius Linnaeus
Hylocichla mustelina (Gmelin)
Hylocichla guttata Bangs & Penard
Hylocichla ustulata (Tschudi)
Hylocichla minima (Baird)
Sialia sialis (Linnaeus)
Regulus satrapa Lichtenstein
Regulus calendula (Linnaeus)
Bombycilla cedrorum Vieillot
 **Lanius excubitor* Vieillot
Sturnus vulgaris Linnaeus
 **Vireo griseus* (Gmelin)
Vireo solitarius (Wilson)
Vireo olivaceus (Linnaeus)
 **Vireo philadelphicus* (Cassin)
Vireo gilvus (Vieillot)
Mniotilta varia (Linnaeus)
 **Vermivora chrysoptera* (Linnaeus)
 **Vermivora leucobronchialis*
 (Brewster)
Vermivora ruficapilla (Wilson)
Vermivora celata (Say)
Parula americana (Wilson)
Dendroica petechia (Gmelin)
Dendroica magnolia (Wilson)
Dendroica tigrina (Gmelin)
Dendroica caerulescens (Gmelin)
Dendroica coronata (Linnaeus)
Dendroica virens (Gmelin)
Dendroica fusca (Müller)

*Yellow-throated Warbler	* <i>Dendroica dominica</i> (Linnaeus)
Chestnut-sided Warbler	<i>Dendroica pennsylvanica</i> (Linnaeus)
Bay-breasted Warbler	<i>Dendroica castanea</i> (Wilson)
Blackpoll Warbler	<i>Dendroica striata</i> (J. R. Forster)
Pine Warbler	<i>Dendroica pinus</i> (Wilson)
Prairie Warbler	<i>Dendroica discolor</i> (Vieillot)
Palm Warbler	<i>Dendroica palmarum</i>
Oven-bird	<i>Seiurus aurocapillus</i> (Linnaeus)
*Norther Water-thrush	* <i>Seiurus noveboracensis</i> (Gmelin)
*Louisiana Water-thrush	* <i>Seiurus motacilla</i> (Vieillot)
Yellowthroat	<i>Geothlypis trichas</i> (Swainson)
*Yellow-breasted Chat	* <i>Icteria virens</i> (Linnaeus)
*Hooded Warbler	* <i>Wilsonia citrina</i> (Boddaert)
Canada Warbler	<i>Wilsonia canadensis</i> (Linnaeus)
*Wilson Warbler	* <i>Wilsonia pusilla</i> (Wilson)
American Redstart	<i>Setophaga ruticilla</i> (Linnaeus)
House Sparrow	<i>Passer domesticus</i> (Linnaeus)
*Bobolink	* <i>Dolichonyx oryzivorus</i> (Linnaeus)
Eastern Meadowlark	<i>Sturnella magna</i> (Linnaeus)
Red-Wing	<i>Agelaius phoeniceus</i> (Linnaeus)
*Orchard Oriole	* <i>Icterus spurius</i> (Linnaeus)
Baltimore Oriole	<i>Icterus galbula</i> (Linnaeus)
Rusty Blackbird	<i>Euphagus carolinus</i> (Müller)
Common Grackle	<i>Quiscalus quiscula</i>
Brown-headed Cowbird	<i>Molothrus ater ater</i> (Boddaert)
*Western Tanager	* <i>Piranga ludoviciana</i> (Wilson)
Scarlet Tanager	<i>Piranga erythromelas</i> Vieillot
Eastern Cardinal	<i>Richmondia cardinalis</i> (Linnaeus)
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i> (Linnaeus)
Indigo Bunting	<i>Passerina cyanea</i> (Linnaeus)
*Evening Grosbeak	* <i>Hesperiphona vespertina</i> (W. Cooper)
Purple Finch	<i>Carpodacus purpureus</i> (Gmelin)
*Pine Grosbeak	* <i>Pinicola enucleator</i> (Müller)
*Common Redpoll	* <i>Acanthis flammea</i> (Linnaeus)
Pine Siskin	<i>Spinus pinus</i> (Wilson)
American Goldfinch	<i>Spinus tristis</i> (Linnaeus)
*Red Crossbill	* <i>Loxia curvirostra</i> Brehm
*White-winged Crossbill	* <i>Loxia leucoptera</i> Gmelin
Rufous-breasted Towhee	<i>Pipilo erythrophthalmus</i> (Linnaeus)
Savannah Sparrow	<i>Passerculus sandwichensis</i> (Wilson)
Vesper Sparrow	<i>Pooecetes gramineus</i> (Gmelin)
*Lark Sparrow	* <i>Chondestes grammacus</i> (Say)
Slate-colored Junco	<i>Junco hyemalis</i> (Linnaeus)
Tree Sparrow	<i>Spizella arborea</i> (Wilson)
Chipping Sparrow	<i>Spizella passerina</i> (Bechstein)
Field Sparrow	<i>Spizella pusilla</i> (Wilson)
White-crowned Sparrow	<i>Zonotrichia leucophrys</i> (Forster)
White-throated Sparrow	<i>Zonotrichia albicollis</i> (Gmelin)
Fox Sparrow	<i>Passerella iliaca iliaca</i> (Merrem)
*Swamp Sparrow	* <i>Melospiza georgiana</i> (Latham)
Song Sparrow	<i>Melospiza melodia</i> (Wilson)
*Snow Bunting	* <i>Plectrophenax nivalis</i> (Linnaeus)



Above: Fringe Tree (Chionanthus virginica)
Right: View near Hickory Collection.
Photos: P. Bruns



Notes from the Arnold Arboretum

ARNOLD ARBORETUM WEATHER STATION REPORT JULY 1, 1970 TO JUNE 30, 1971

Average temperature for the year: 50.1°

Snowfall during the winter of 1970-71: 53.6 inches

Precipitation: 43.44 inches

Warmest Temperature: 101° on July 26, 1970

Coldest Temperature: -9° on January 19, 1971

	Avg. Max. Temp.	Avg. Min. Temp.	Avg. Temp.	Extreme Max.	Extreme Min.	Precipi- tation
Jul. 70	87.2	64	75.6	101	54	3.08
Aug. 70	86.5	61.6	74	99	52	6.31
Sept. 70	75.6	53.8	64.7	94	42	2.59
Oct. 70	65.2	43.3	54.3	84	25	2.81
Nov. 70	52.2	36.5	44.4	65	17	4.54
Dec. 70	37.1	19	28	61	8	6.13
Jan. 71	33.1	11.2	22.2	47	-9	1.81
Feb. 71	37.8	21.3	29.6	53	-1	5.02
Mar. 71	45.4	28	36.7	65	20	2.93
Apr. 71	55.9	35.5	45.7	76	27	2.75
May 71	67.3	46.4	56.9	84	38	4.07
June 71	82.8	55.9	69.4	95	41	1.40

ALFRED J. FORDHAM

CORRECTION

The caption under the photograph of *Fothergilla* plants on page 258 of the July issue of *Arnoldia* should read "cuttings" not "seedlings." The photograph was taken by Heman Howard.

Arnoldia Reviews

Methods of Hydrobiology, by Jürgen Schwoerbel

The author of this work defines hydrobiology as a part of biology concerned with the life of organisms in water and does not admit it as a separate discipline. However he then limits his consideration to the methods of study of the ecology of accumulations of fresh water in lakes, ponds, or even holes in trees as well as to standing, running or underground waters. The emphasis in the volume is on the methods of possible study ranging from the type of equipment to procedures and to techniques of analysis and of calculation. Comparisons and evaluations of each topic are made freely and frankly. Although this book is directed to the professional scientist involved in studies of fresh water in the field, a student familiar with the vocabulary of hydrobiology will find in it much of value. The reader without this knowledge must recognize that this is not an elementary textbook nor a book for the identification of polluting organisms.

This is the first English edition of a work published originally in German. Following the text are appendices describing the methods of preservation and fixation of aquatic organisms and the techniques for the culture of such forms of life. A list of firms which make hydrobiological apparatus includes only companies in Germany, Austria and Switzerland. The references supporting the text are listed in an appendix and arranged according to the chapters. They may be referred to in the text or be supplementary suggestions. References are given to papers published as recently as 1967, a remarkable feat for a translated volume. As might be expected the majority of the references are to papers published in the German language. As western hemisphere authors and publications are not cited frequently this volume is a useful reference to European literature and research.

R. A. H.

Jürgen Schwoerbel. *Methods of Hydrobiology*. Freshwater Biology. Oxford: Pergamon Press, 1970. 200 pages, 100 figures. \$8.00.

**The Story of the Royal Horticultural Society,
by Harold R. Fletcher**

There is an old saw to the effect that those who will not learn from history are doomed to repeat it. We horticulturists are fortunate that we have *The Story of the Royal Horticultural Society* to instruct us. This great society, founded in 1804, has seen gardening fashions come and go. It has survived financial disaster. It has endured wars and rumours of wars. Begun and served by the elite of British horticulture, it has come to have one of the largest general memberships of any horticultural society. Its publications set the standards against which all horticultural literature is to be judged. Its exhibitions are the envy of other societies. Its awards to plants, to exhibitors, and to horticulturists take pride of place before all others.

Service to Horticulture is perhaps the unwritten motto of the Society. From the beginning the Royal Horticultural Society was active in the propagation of knowledge about plants — and in the importation and dissemination of new kinds of plants from abroad. John Reeves and Robert Fortune introduced Chinese plants. David Douglas explored the American West Coast. Thomas Knight grew exotic plants, and bred new varieties of fruits at home. A series of conferences, on orchids, primulas, chrysanthemums, dahlias, daffodils, conifers, to name only a few, have given occasion to survey the state of knowledge of taxonomy, nomenclature, culture, and breeding of many horticultural groups. The examinations for the National Diploma in Horticulture, and the resultant training programs at Kew and Wisley, and elsewhere, have done much to maintain the high standards of competence associated with British gardeners.

Dr. Harold R. Fletcher, late Director of the Royal Botanic Garden, Edinburgh, has completed the task so ably begun by Mr. A. Simmonds, and has given us a masterly, and very readable survey of the history not only of the Royal Horticultural Society, but also of horticulture in Britain.

G. P. DEW., JR.

Harold R. Fletcher, *The Story of the Royal Horticultural Society, 1804-1968*, London: Oxford University Press, 1969. 564 pages. £5.25

The Royal Botanic Garden Edinburgh, 1670–1970, by Harold R. Fletcher and William H. Brown

The Royal Botanic Garden, Edinburgh, had its beginning in a Physic Garden, established in a garden plot in the grounds of Holyroodhouse by two Edinburgh physicians, Andrew Balfour and Robert Sibbard. Its original purpose was to provide demonstration materials for medical classes in the University. After many years, and numerous vicissitudes it was finally established on a portion of its present grounds about 1822. Throughout its history it and its staff have been involved with teaching — first with the teaching of material medica to medical students, and most recently with the teaching of plant taxonomy.

In the early part of this century, the Royal Botanic Garden, Edinburgh, was much involved with plant introduction from eastern Asia, especially from the Himalayas and China. Primulas, lilies, and rhododendrons, particularly, have been the forte of the garden and its staff. The names of George Forrest, the collector, and Bailey Balfour and William Wright Smith, the taxonomists and Directors, are inextricably intertwined. In recent years Peter Davis has taught us much about the flora of Turkey.

As with the *Story of the Royal Horticultural Society*, H. R. Fletcher and W. H. Brown have built upon foundations laid by their predecessors and given us a most readable and detailed story of the triumphs and tribulations that have made the Royal Botanic Garden, Edinburgh, the outstanding institution that it is today.

G. P. DEW., JR.

Harold R. Fletcher and William H. Brown, *The Royal Botanic Garden, Edinburgh, 1670–1970*, Edinburgh: H. M. Stationery Office, 1970. 309 pages. £3 12s od [£3.60] net.





Above: Spiraea nipponica

Top Left: Bladdernut (Staphylea sp.)

Bottom Left: Asiatic Sweetleaf (Symplocos paniculata)

Photos: P. Bruns

ARNOLDIA is a publication of the Arnold Arboretum
of Harvard University, Jamaica Plain, Massachusetts, U.S.A.

